

# Mining



CONGRESS JOURNAL

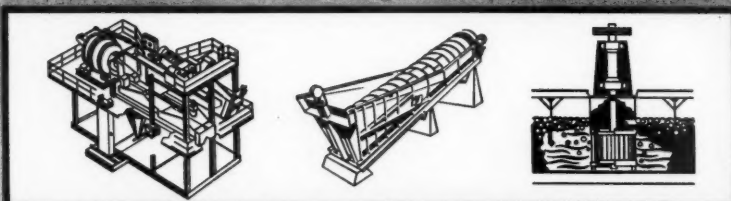


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# if you process ores... **YOU KNOW WEMCO**

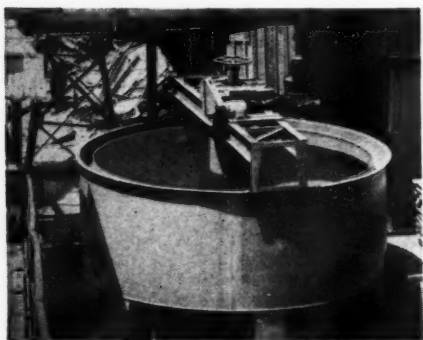


**MOBIL-MILLS**

**S-H CLASSIFIERS**

**FAGERGREN FLOTATION MACHINES**

Behind these familiar products is the WEMCO name and reputation — the reason you rely on WEMCO equipment to do your job best.



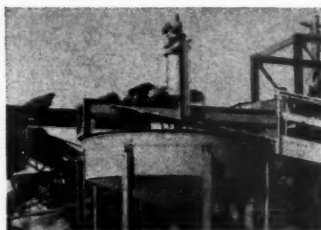
## **WEMCO THICKENERS:**

**Sizes and Types:** WEMCO Thickeners are job-tailored to specific applications and are available in sizes up to 400' diameter. Job requirements determine use of Beam (up to 45'), Lo-Truss (32' to 60'), Hi-Truss (60' to 100'), Center Pier (75' to 175') or Traction (125' to 400') type of construction.

**Features:** Depending on application, WEMCO Thickeners offer a wide choice of construction and mechanical features. These include: heavy duty worm or spur gear mechanisms and bearings; large feed wells; strong cast spiders; overload alarms; manual or motorized screw lifting devices on small sizes; vertical hydraulic lift on Center Pier type; chain and sprocket gear-motor drive on small sizes; dual fluid drive on Center Pier and Traction types; large diameter discharge cones; wood or steel tanks.

## **— but here's something you may not know**

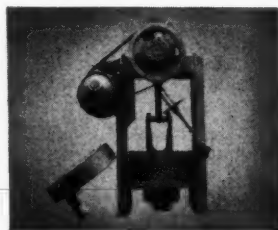
— WEMCO also makes a complete line of Thickeners, Hydroseparators and Diaphragm Pumps. Because they give you true WEMCO value — in performance, economy and reliability — you'll want to know more about them. Look over these specifications... it **pays** to know WEMCO.



## **WEMCO HYDROSEPARATORS:**

**Sizes and Types:** WEMCO Hydroseparators are available in sizes up to 100' diameter. Duty requirements determine use of Beam (up to 40'), Lo-Truss (35' to 55'), or Hi-Truss (55' to 100') type of construction.

**Features:** Depending on job requirements, WEMCO Hydroseparators offer a wide range of construction and mechanical features, including: heavy duty worm gear mechanisms and bearings; large diameter cold rolled steel shafts; large feed wells and discharge cones; strong cast spiders; manual or motorized lifting devices and efficient drive arrangements.



## **WEMCO DIAPHRAGM PUMPS:**

**Sizes and Types:** WEMCO Diaphragm Pumps are available in 2", 3" and 4" sizes. Each size can be obtained in either simplex, duplex or triplex arrangements.

**Features:** WEMCO Diaphragm Pumps are designed and built for efficient, trouble-free operation. Features include: Rugged welded steel frame, uniformly weighted rubber ball valves, rubber valve seats, long wearing rubber diaphragm, adjustable stroke and indicator, handwheel-operated variable speed drive for speed adjustment while pump is in operation.

**FOR FURTHER INFORMATION** — Call or write to your nearest WEMCO sales engineer. He will be glad to give you full details.

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**WESTERN MACHINERY COMPANY**

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Mobil-Mills • Cool Spindles • HNS Thickeners • HNS Pumps • Sand Pumps • Asphalts  
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Supergrain & Shufeldt Flotation Machines • S-H Classifiers • Attrition Machines  
HNS Laboratory Mills • Dissolution Tanks • Washers • Feeders • Repellers



## What's NEW in Roof Bolting

**PATTIN Has Designed a New Self-Centering Bolt Head and Protective Shell Tube.**

THREE new improvements — each one helping to solve a packaging, shipping or installation problem—cut usual bolt handling and installation time up to 30%. Bolting crews can now be furnished with shipping bundles of 250 assembled bolts and shells containing 25 smaller bundles of 10 assemblies for easy handling—each shell covered with a protective tube, as shown above, to prevent damage to threads. It takes only a few seconds to remove the shell's protective tube and slip a plate washer (having a sufficiently large hole) over the shell and down the bolt to the new supporting bolt head that self-centers the plate washer on the head and it's then ready to be installed. Shipping—with bolt and shell assembled and with protective tubes covering the shells means—good bolt and shell thread fit—no lost parts—easier and quicker handling and installation—which mean savings in time and dollars. No special nuts or ears are needed on the bolts.

For safer roofs—hard or soft—the PATTIN expansion shell having double the usual shell expansion plus a 3-inch contact with the hole wall provides the strongest known anchorage for roof bolts. They are easy to install as no definite drilling depth is required and the shell can be anchored any place in the hole without turning while being tightened.

Patents  
Applied For

**PATTIN'S New  
Self-Centering  
Bolt Head**



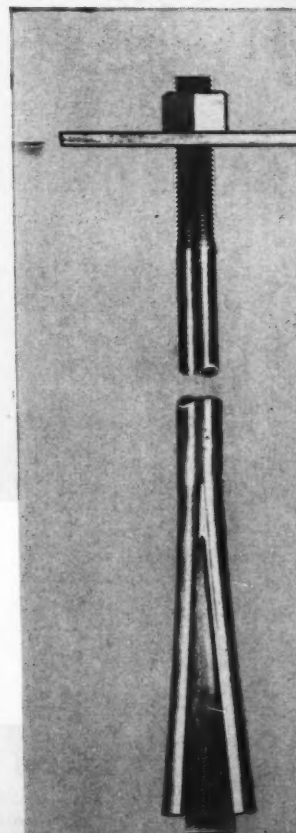
THE PATTIN SPLIT TYPE BOLT, one of the first slotted bolts, continues to be a favorite wherever split type bolts are used. The bolt is a full 1-inch in diameter with cut threads and furnished with Hex or Square nuts and various size plates and wedges.

ALL MINING COMPANIES now bolting, experimenting or planning to roof bolt can depend on PATTIN shells and bolts for better anchorage and reduced time in bolting cycles. Our engineers are available for consultation and demonstrations. Write or phone us—we'll gladly work with you on any present or future bolting program.

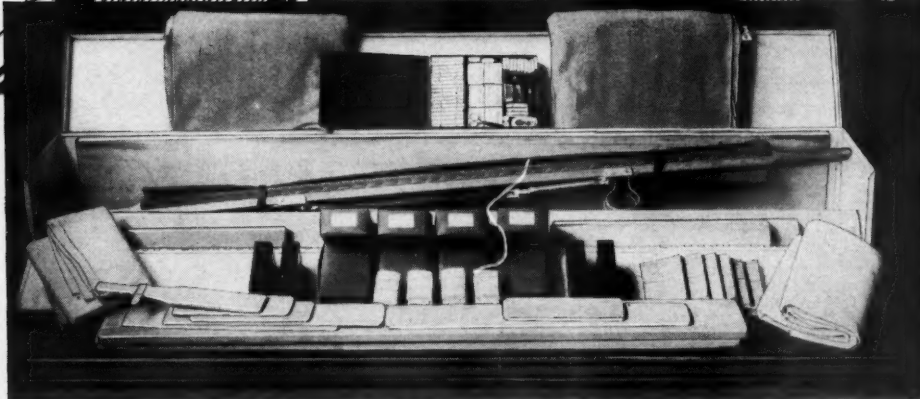
# PATTIN

**MFG. COMPANY**  
*"The Pioneer in Roof Bolting"* Marietta, Ohio

Stop in to see us  
**Booth A-3—BLUEFIELD COAL SHOW—May 26-28**



# Increase your Team's chance of Winning with the M.S.A. CONTEST OUTFIT and TRAINING MATERIALS...



Your team gains greater speed and efficiency, both in training and in actual competition, with the M.S.A. Contest Outfit and training materials. All required materials are neatly arranged, easy to see, instantly accessible. This means you can select the right materials, at the right time and bring your team to a quick, point-winning solution to every accident problem.

The Contest Outfit box is made of strong steel and finished in white. Its design, resulting from years of experience with first aid practice and competition, prevents loss of materials, and contributes to neatness and efficiency. Strong handles on each end of the box make it easy to carry. Write for details.

## CONTENTS

- 1 Army-Type Stretcher
- 2 Pieces Canvas 6' x 8'
- 2 Single Wool Blankets
- 6 1 yd. Packages Picric Gauze
- 6 1 yd. Packages Sterile Gauze
- 1 1 oz. btl. Aromatic Spirits of Ammonia
- 1 Horn Spoon
- 6 Paper Drinking Cups
- 1 Metal Box for dressings
- 1 Set of 15 Wood Splints
- 1 Pair 4" bandage Scissors
- 2 Army-Type Tourniquets
- 48 40" Triangular Bandages, unsterilized
- 12 1" Compress Bandages, unsterilized
- 12 2" Compress Bandages, unsterilized
- 18 4" Compress Bandages, unsterilized
- 2 7' lengths 3/8" Pipe for improvised stretcher
- 4 Wood Blocks for heat applications
- 6 U. S. Bureau of Mines First Aid Manuals
- 2 Padlocks
- 1 Strong Steel Box, as Illustrated

## CONTEST PRIZES AND SOUVENIRS

Place your orders with us! Complete selection of knives, pen and pencil sets, wallets, raincoats, lighters, key cases, tie clips, and many others. Write for details.



When you have a safety problem, M.S.A. is at your service. Our job is to help you.

## MINE SAFETY APPLIANCES COMPANY

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At Your Service: 77 Branch Offices in the United States and Mexico

## MINE SAFETY APPLIANCES CO. OF CANADA, LTD.

Toronto, Montreal, Calgary, Edmonton, Winnipeg,  
Vancouver, New Glasgow, N.S.

# What do you **KNOW** about your Ore Reserves?

In most cases the only way to obtain accurate information regarding the extent and quality of ore reserves is by a continuing program of properly planned

## DIAMOND CORE DRILLING

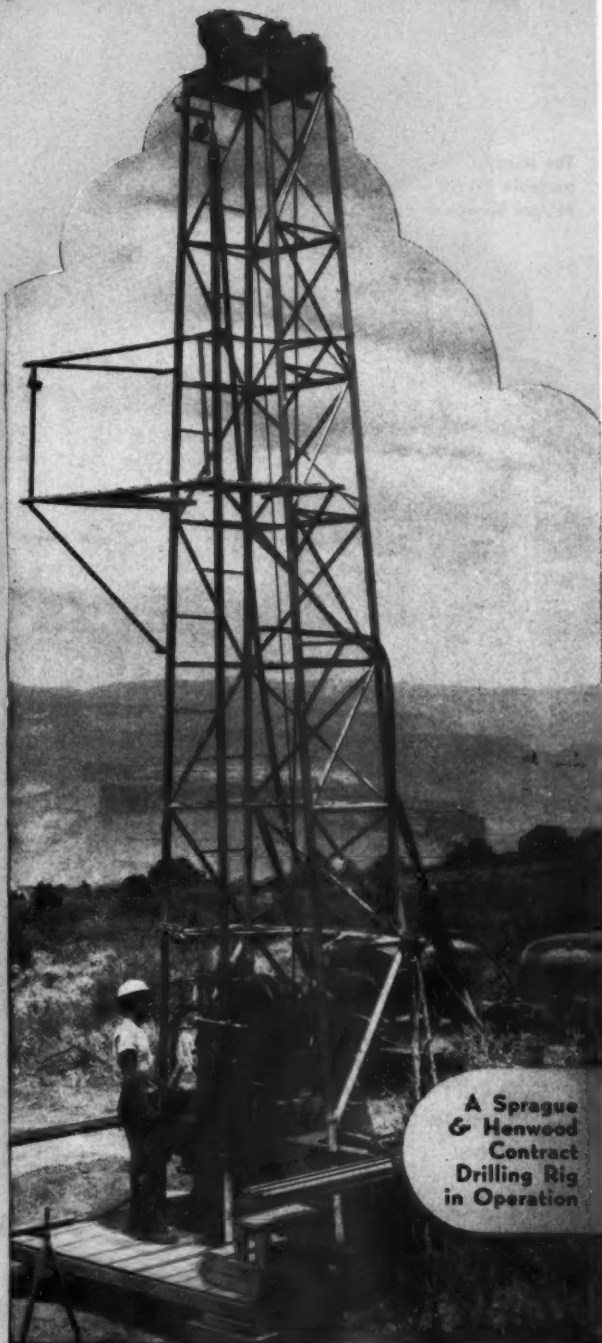
and that's where we come in. For more than sixty years our Contract Drilling Department has been rendering a highly satisfactory technical service to prominent mining and quarrying companies throughout the United States and many other countries. The cores recovered not only prove the extent of ore bodies but also permit both physical and chemical examinations of the ore that will be mined and milled during the next month, the next year or the next twenty years.

Compared to the benefits received the cost of this continuing exploratory core-drilling service is very modest and we welcome opportunities to make preliminary examinations and to submit estimates—without charge or obligation.

### Sprague & Henwood, Inc. Scranton 2, Pa.

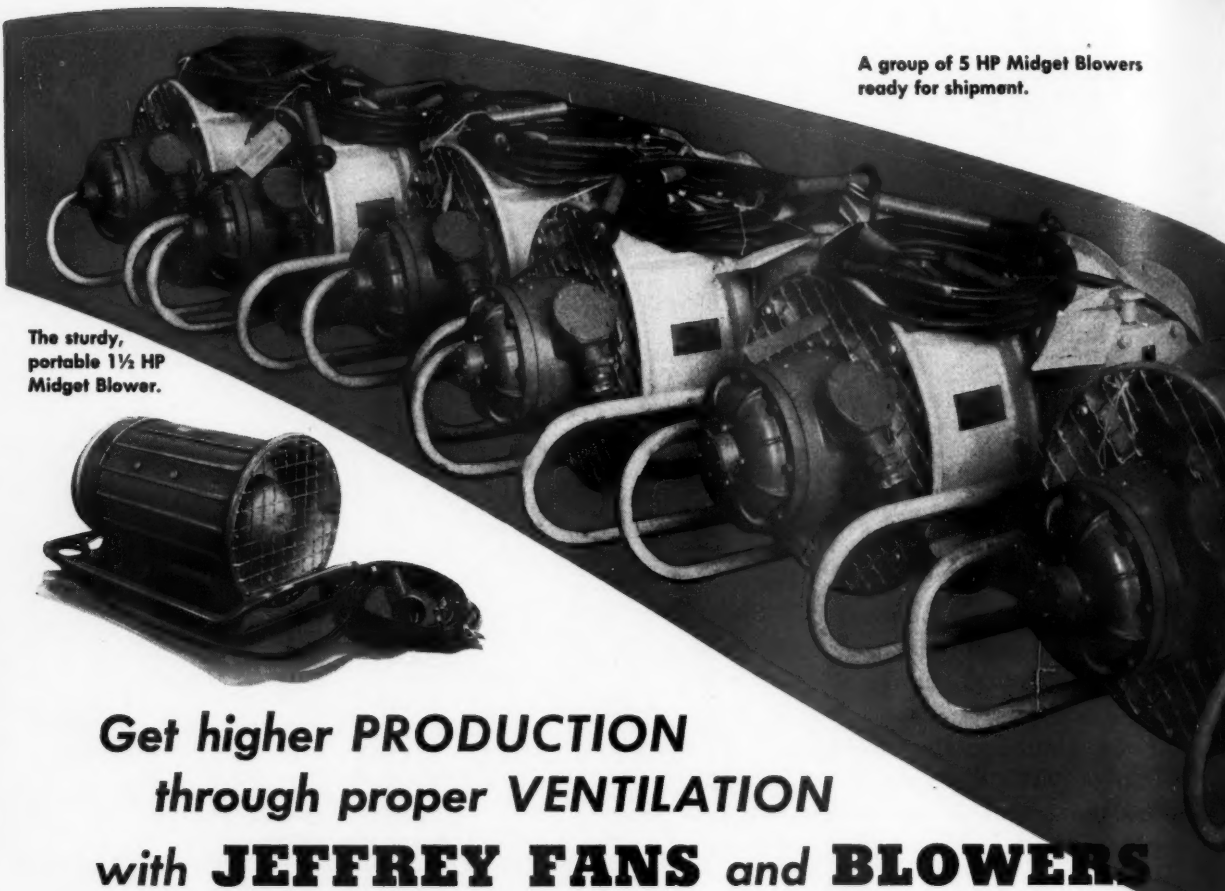
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Manufacturers, also, of High-Speed Core Drilling Machines, "Oriented Diamond Bits" and complete accessory equipment for Core Drilling and Soil Sampling. Illustrated bulletins containing complete information mailed on request.



***The Sun never sets on Sprague & Henwood's Contract Diamond Core Drilling Operations***





A group of 5 HP Midget Blowers  
ready for shipment.

The sturdy,  
portable 1½ HP  
Midget Blower.

## Get higher **PRODUCTION** through proper **VENTILATION** with **JEFFREY FANS and BLOWERS**

Proper mine ventilation is a sure way to raise production. Fresh air makes miners feel safer and healthier. Their morale goes up. So does production. Ask one of the hundreds of bituminous or anthracite mine operators who have installed fans and blowers built by Jeffrey—a leader in mine ventilation engineering since 1909.

Years of research and development, experience with fan and blower installations under every conceivable condition, the best in material and workmanship—all are yours from Jeffrey. Jeffrey fans and blowers de-

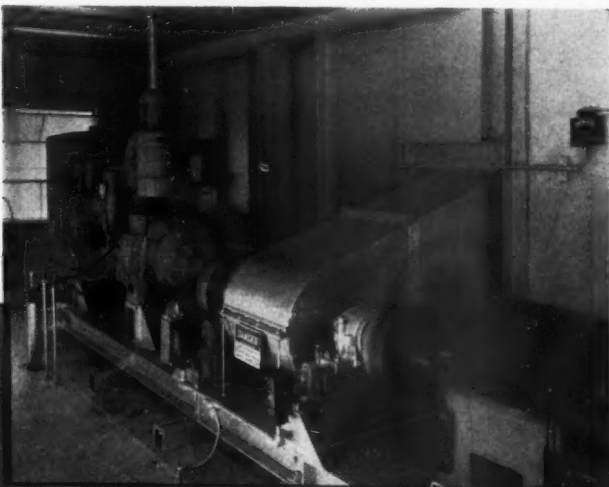
liver with peak efficiency . . . are economical to operate, and low on maintenance.

Jeffrey's fan and blower line, in both open and permissible types, includes: AERODYNE Fans for 20,000 to 500,000 CFM up to and including pressure of 20 WG; AERODYNE JR. Fans for 5,000 to 150,000 CFM not to exceed pressure of 4 WG; and blowers and exhausters for use with tubing for auxiliary, room, or hard-to-reach ventilation, including AERODYNE Midget Blowers, Type 61 Blowers, and Universal Blowers.

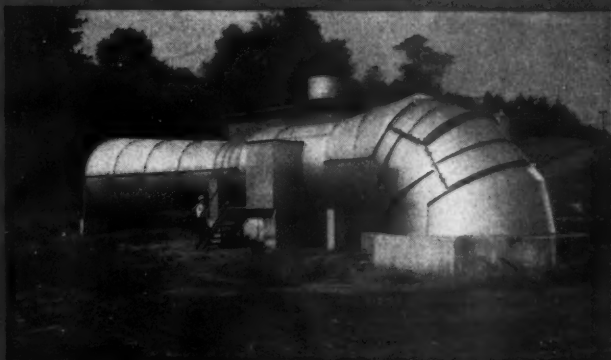
Write for Catalog 797 for complete details.



At left: Self-contained Universal Blower can be set at eight different angles for blowing or exhaust.



Motor drive for AERODYNE Fan, showing auxiliary gasoline power unit which cuts in automatically if electric power fails.



AERODYNE Fan installation at mine of a large steel company.



**THE JEFFREY**

**IF IT'S MINED, PROCESSED OR MOVED  
...IT'S A JOB FOR JEFFREY!**

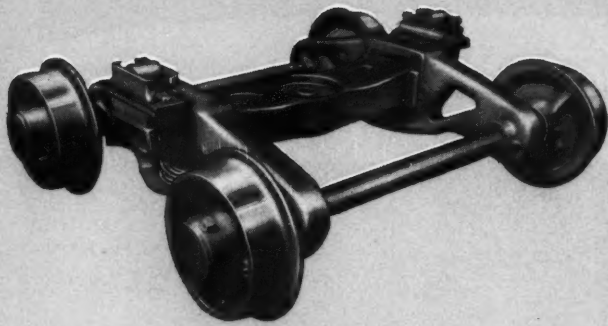
ESTABLISHED 1877  
**MANUFACTURING CO.**

Columbus 16, Ohio

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in principal cities*

**PLANTS IN CANADA, ENGLAND, SOUTH AFRICA**

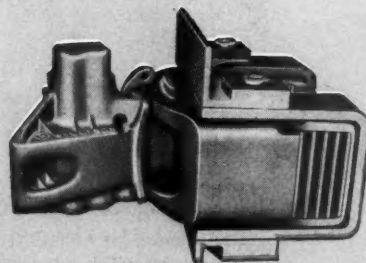
# NATIONAL equipment cuts per-ton costs



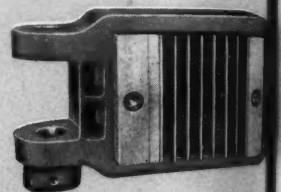
**NC-1 MINE CAR TRUCK** is the latest example of National pioneering in better equipment. Among NC-1 truck advantages are longer and softer ride springs, friction damping mechanism that controls vertical and transverse oscillations, automatic frame alignment and cast one-piece bolster with large lubricated center bearing.



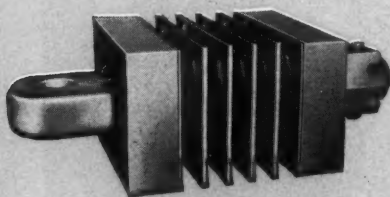
**WILLISON AUTOMATIC COUPLERS** save time with maximum safety, couple at either end of car or locomotive, require no manual assistance, eliminate damaging slack, permit high speeds with maximum stability.



**NATIONAL MI-235 Rubber-Cushioned Draft Gear** primarily used in Willison spherical-horn coupler assemblies for drop-bottom cars and locomotives; are effective with link and pin bumpers and in strap yokes.



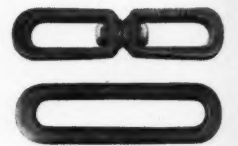
**NATIONAL MI-225 Rubber-Cushioned Draft Gear** for locomotives and high capacity cars not required to operate through rotary dump. Give maximum impact protection in minimum space.



**NATIONAL MI-230 Rubber-Cushioned Draft Gear** for cars in rotary dump service. High-capacity rubber pads with soft initial action provide maximum impact protection, lengthen equipment life. Available in capacities and designs to fit individual requirements.



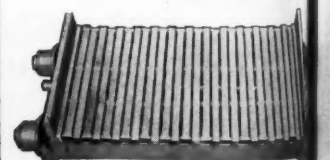
**NACO STEEL WHEELS**, made from quality-controlled Naco cast steel—of high yield point, great tensile strength and ductility—reduce tread spalling or flange breaking. Available in all sizes regularly used in mining or industrial operations.



**NACO STEEL SWIVEL HITCHING AND LINK**



**CAST ALLOY STEEL ORE-GRINDING BALL**



**CAST STEEL PALLET AND MALLEABLE SINTERING BARS**

*Attend American Mining Congress 1954 Mining Show  
San Francisco, September 20th-23rd  
NATIONAL PRODUCTS ON DISPLAY AT BOOTH 830*

## NATIONAL MALLEABLE AND STEEL CASTINGS



**COMPANY • Cleveland 6, Ohio**



AUGUST, 1954

VOLUME 40 • NUMBER 8

# Mining

## CONGRESS JOURNAL

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■ **FRONT COVER:** In 1904 copper ore from Bingham Canyon first reached the mill conceived and built by Daniel C. Jackling, "Father of the Porphyries." In 1954, 50 years later, output of the Utah Copper Division of Kennecott Copper Corp., amounts to nearly one-third of the total domestic copper production.

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# Increase your footage

Use CLEVELAND Air Legs and Drills...the easiest way



## THE FEED YOU NEED — FROM ZERO FEED TO FULL LINE

Eleven detent positions enable drill operator to set and maintain pressures in a range from zero to full-line feeding pressure — with an increase of 9 psi at each setting. That's why a CLEVELAND Air Leg and H10AL Drill combination gives top performance in any kind of rock.

Shown here is a CLEVELAND AL-92 Telescopic Air Leg with H10AL Drill. Because of space limitations, full length isn't shown.

*There's a*  
**CLEVELAND Air Leg**  
to meet every need

**CLEVELAND AL-92 Telescopic Air Leg with H10AL Drill**  
and exclusive 11-position feed control

### SPECIFICATIONS

Standard, automatic controlled wet-type backhead.

Chuck Sizes.....	7/8" x 4 1/4"	— or other popular steel shank sizes	
Weight, Drill.....	60 lbs.		
Air Hose.....	3/4"		
Water Hose.....	1/2"		
Full Feed Travel.....	4'		
Collapsed Feed.....	2' ea. piston	3' ea. piston	
Closed Length.....	48"	60"	
Extended Length.....	96"	132"	
Air Leg Weight.....	37 lbs.	42 lbs.	

**CLEVELAND AL-90 Single Extension Air Leg**  
for use with H10AL Drill and exclusive  
11-position feed control

### SPECIFICATIONS

Weight, Drill.....	60 lbs.
Air Hose.....	3/4"
Water Hose.....	1/2"
Feed Travel.....	36" — 48" — 60"
Closed Length.....	56 3/4" — 69" — 81 1/4"
Extended Length.....	92 3/4" — 117" — 141 1/4"
Air Leg Weight.....	30 lbs.—34 lbs.—37 lbs.

**CLEVELAND AL-91 Single-Extension Air Leg** for use  
with any 35-lb., 45-lb., or 55-lb. class rock drill.  
Feed control built into air leg.

### SPECIFICATIONS

Standard wet, or automatic controlled,  
wet-type backhead available.

Air Hose.....	3/4"
Water Hose.....	1/2"
Feed Travel.....	36" — 48" — 60"
Closed Length.....	58" — 71" — 83"
Extended Length.....	94" — 119" — 143"
Air Leg Weight.....	35 lbs.—38 lbs.—41 lbs.



# per man-shift!

## to drill rock

**Choose  
the drilling combination  
that's best for you  
from the industry's only  
complete line of telescopic  
or single-extension air legs.**

**M**INERS like to use a CLEVELAND Air Leg and H10AL Drill combination. It gives them real flexibility — they can use it as a drifter . . . as a stoper . . . or as a hand-held drill . . . set-ups are quick and easy.

It's an easy-handling combination, also. The air leg supports the drill and absorbs fatiguing recoil. You get flexible feeding pressure, too — from zero to full line. That's why miners drill more footage with CLEVELAND, yet are less tired at the end of their shift.

Exclusive CLEVELAND built-in feed control in the H10AL Drill eliminates a third hose and cumbersome "Y" connections. There's no feed-control bleed valve — the operator doesn't have to bleed off air continuously, to maintain suitable feeding pressure. He can change or advance the position of the leg easily and quickly.

The air leg holds the drill in line with the hole — thus reducing front-end drill wear and practically eliminating rotation strains.

These are ways a CLEVELAND Air Leg and H10AL Drill combination helps you get more drilling for less cost. Take advantage of them.

Write today for Bulletin RD-30 for complete information.



**CLEVELAND AL-93** Telescopic Air Leg for use with any 35-lb., 45-lb., or 55-lb. class rock drill.  
Feed control built into air leg.

#### SPECIFICATIONS

Full Feed Travel .....	4'	6'
Collapsed Feed .....	2' ea. piston	3' ea. piston
Closed Length .....	50"	62"
Extended Length .....	98"	134"
Air Leg Weight .....	42 lbs.	47 lbs.



## CLEVELAND ROCK DRILL DIVISION

### Le Roi Company

A Subsidiary of Westinghouse Air Brake Co.

12500 BERA ROAD • CLEVELAND 11, OHIO

RD-30



# "Abrasion and corrosion *the worst...* Tiger Brand Wire Rope *the best!*"

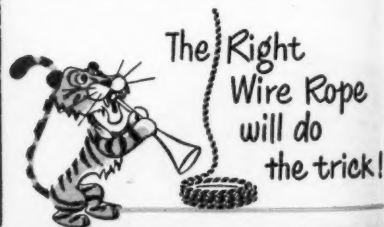
says C. G. TUGEND, FREDERICKTOWN SAND & GRAVEL CO.

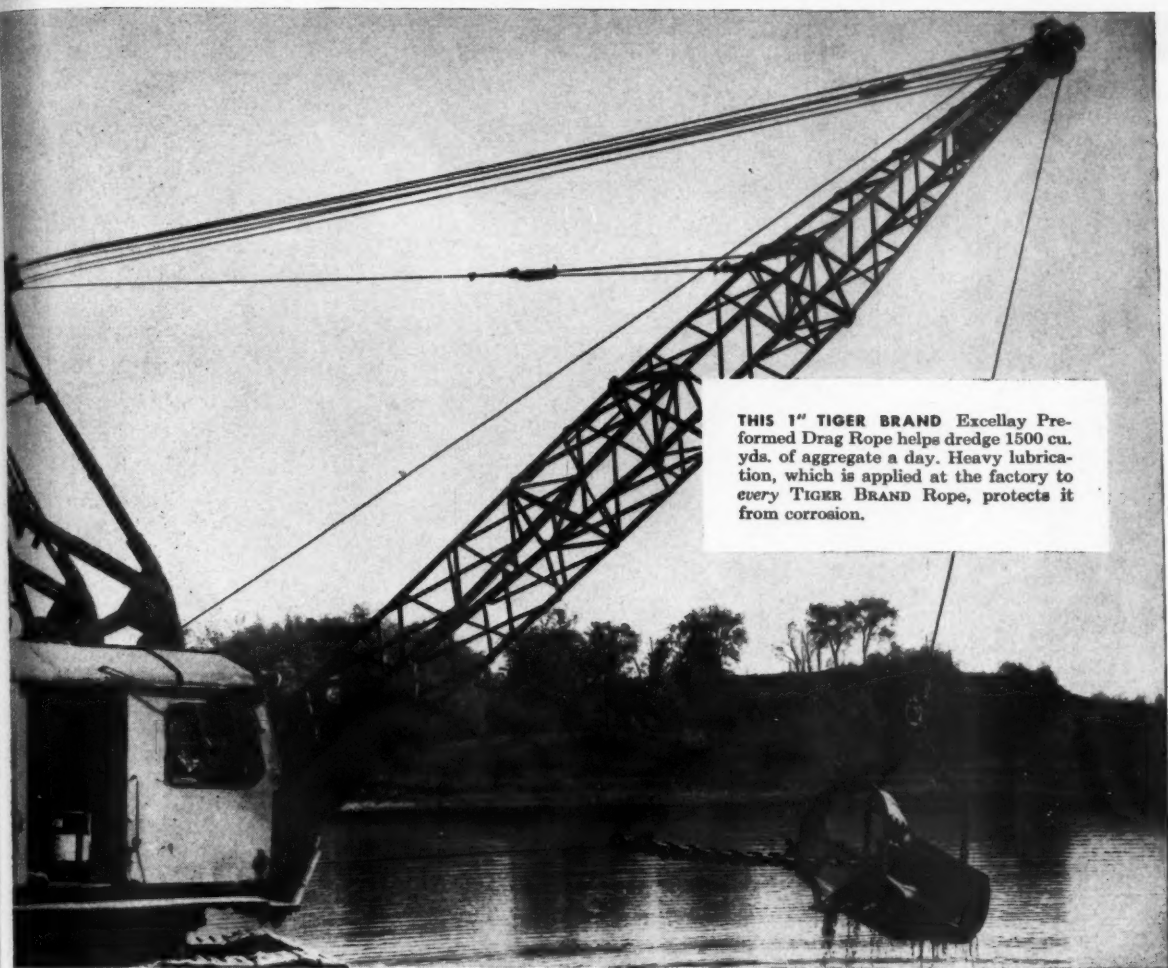


**EVERY ROPE** on all 5 excavating and materials handling machines at Fredericktown Sand & Gravel Co. is **TIGER BRAND**. This important stone processing company consults frequently with American Wire Rope Engineers and follows their recommendations to get the best possible service from each rope.

● If you want to know how good **TIGER BRAND** Rope is, just talk to C. G. Tugend, Secretary-Treasurer and General Manager of Fredericktown Sand & Gravel Co. in Fredericktown, Ohio. Here's what Mr. Tugend says about **TIGER BRAND**:

"We have some of the toughest operating conditions I've ever seen for wire rope. We're dredging in corrosive river water that is 7% sodium sulfate. On top of that, our drag ropes have to scrape through hard glacial rock





THIS 1" TIGER BRAND Excellay Preformed Drag Rope helps dredge 1500 cu. yds. of aggregate a day. Heavy lubrication, which is applied at the factory to every TIGER BRAND Rope, protects it from corrosion.

along the river. TIGER BRAND Rope works in these conditions constantly, yet has never shown any sign of rust and requires only a normal replacement. That's why we use it exclusively on all our equipment.

"We did try a different brand of rope once . . . on our 2½ cu. yd. Sauerman Hoist. But that will be the last time. The new competitive rope carried the same catalog specification as the TIGER BRAND Rope it replaced, yet the new one lasted less than ½ as

long, contracted unevenly, and kinked so badly that it jammed the pulleys. We spent 6 days repairing that rope . . . lost 9,000 tons of production.

"Since that costly experiment, we've been using TIGER BRAND Rope *exclusively*. It has never shown a tendency to kink; and it is extremely pliable and strong. It has never given one bit of trouble."

For ropes that will give you high quality service, time after time, specify TIGER BRAND. Send the coupon for more information.

American Steel & Wire  
Rockefeller Building  
Cleveland 13, Ohio.

Please send me, without obligation, a copy of your helpful wire rope recommendation book, "The Right Rope for the Job."

Name .....

Company .....

Address .....

City ..... State .....

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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

**USS AMERICAN TIGER BRAND WIRE ROPE**

*Excellay Preformed*



UNITED STATES STEEL



Amsco "non-kinking" manganese steel chain, one of many fine chains from which to choose.



## WHY AMSCO MANGANESE STEEL CHAIN OUTWEARS ORDINARY CHAIN 8 TO 1

*Amsco manganese steel chain resists impact and abrasion*, because it is cast from the toughest steel known. Each link has extra metal on the link sides and ends where most of the abrasion occurs.

*It work hardens right on your job.* Tough service will develop a link hardness up to 500 Brinell. In addition, it will acquire a glasslike polish that helps eliminate life-shortening abrasion.

*It has special link design* to help keep abrasives out of the link-bearing area, thus materially extending service life and minimizing repairs and down time.

*It is designed for specific jobs.* A complete line of carefully designed Amsco manganese steel chains are available for dragline, bucket elevating, clinker drag, logging, etc.

Don't buy just any chain . . . specify Amsco manganese steel chain made from the toughest steel known. For information, write Amsco Division, Chicago Heights, Illinois.



**AMERICAN MANGANESE STEEL DIVISION**  
Chicago Heights, Ill.



*now available*



## *3 1/2" and 4"* **CARSET JACKBITS**

These new large-diameter Carsets offer numerous opportunities for saving time and cutting costs by

- *Drilling Fewer, Wider Spaced Holes*
- *Using More Powder per Hole*
- *Breaking More Rock per Charge*

Wherever loading and hauling equipment will handle larger pieces — wherever large-diameter holes are needed for anchoring, grouting or hydraulic rock jacks, these 3 1/2" or 4" Carset Jackbits can be used to advantage. They extend the proved economies of Tungsten Carbide Jackbits to larger hole sizes — they give the Carset line complete coverage of every drilling application.

The 3 1/2" bit is available for both Ingersoll-Rand "Type" 3 and "Series" 121 threads. The 4" size is for use with "Series" 127 (K) thread on 1 1/2" round steel.

Call your Ingersoll-Rand representative today and try these large-hole bits on your present job. They may save you a lot of money.



998-15

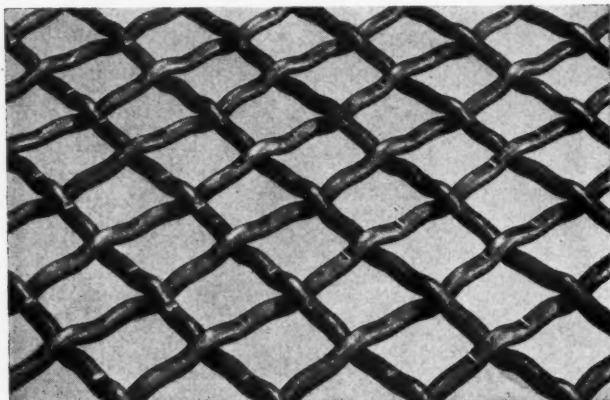
**Ingersoll-Rand**  
11 BROADWAY, NEW YORK 4, N. Y.

ROCK DRILLS • COMPRESSORS • AIR TOOLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • OIL & GAS ENGINES

# See Hewitt-Robins at San

## Learn How Hewitt-Robins Can Help Solve Your Bulk Materials Handling Problems, Large or Small

Hewitt-Robins is the only company that designs and manufactures a complete line of equipment for handling and processing solids, liquids and gases in bulk.



**Screen Cloth.** Hewitt-Robins screen cloth is specially engineered to accurately size large tonnages and cut screening costs . . . utilizing a full range of metallic wire to meet individual job requirements . . . available in standard production size openings from 3/16" and coarser; wire sizes from .105" up to and including 1" diameter.



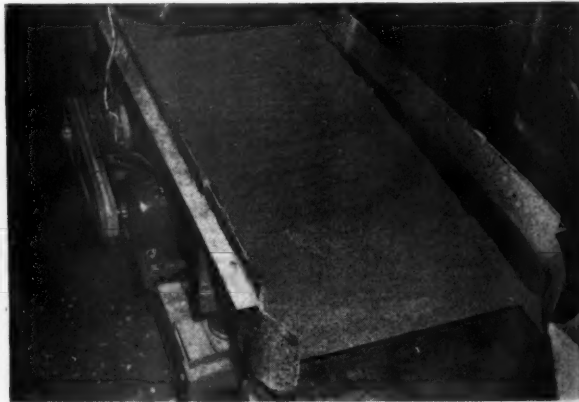
**Vibrating Screens.** Hewitt-Robins manufactures four types of economical vibrating screens . . . Gyrex® positive stroke 4-bearing screens; Eliptex® horizontal operating flat screens; Vibrex® full-floating, unbalanced pulley-type 2-bearing screens and the Eliptex Dewaterizer having specially designed Eliptex screen with micron-size opening stainless steel flat rod deck.

We specialize in vibrating equipment to screen, feed or shakeout material—belt conveyor systems (both belting *and* machinery) to convey solids in bulk—hose to handle liquids or gases.

Throughout the world, Hewitt-Robins equipment and complete systems are setting new records for safe,



**Belt Conveyors.** Hewitt-Robins designs and manufactures a complete line of belt conveyor systems engineered to meet the specific requirements of particular jobs . . . Belting, conveyor machinery and component parts are readily available from standard "on-the-shelf" stock, and are guaranteed to provide top conveyor performance.



**Vibrating Feeders and Conveyors.** Fully mechanical, high capacity—low power consumption vibrating feeders easily maintained by your own personnel. Continuously balanced vibrating conveyors now available in longer units with higher capacities at lower horsepower. Handle a wide range of materials—wet or dry, lump or pulverized, packaged or loose, hot or cold, abrasive or corrosive.



# HEWITT-ROBINS

EXECUTIVE OFFICES, STAMFORD, CONNECTICUT

# Francisco Booths 307 & 321

dependable, economical operation . . . speeding up production and cutting costs-per-ton.

Remember when you visit the show this year in San Francisco, make it a point to see the big exhibit of Hewitt-Robins equipment . . . talk over your bulk materials handling and processing problems with our staff of experts.



**Hose.** Hewitt-Robins manufactures over 1,000 types of industrial hose . . . each designed to fill a specific hose application. Hewitt-Robins hose has proved its superiority on the job. In case after case, actual performance records prove that Hewitt-Robins hose is safer, performs longer, provides greater economy.



**Shakeouts.** Hewitt-Robins Car Shakeouts handle wet, compacted and even partially frozen loads. Capacities vary depending upon characteristics of material . . . average unloading time under 5 minutes per car. Two types: 5-ton HD (Heavy Duty) for handling up to 100 cars per day —3½-ton GS (General Service) recommended for up to 10 cars per day. Both models available with companion twin-hook Car Shakeout Hoist.

## INCORPORATED

DOMESTIC DIVISIONS: Hewitt Rubber • Robins Conveyors • Robins Engineers • Restfoam

FOREIGN SUBSIDIARIES: Hewitt-Robins (Canada) Ltd., Montreal • Hewitt-Robins Internationale,

Paris, France • Robins Conveyors (S. A.) Ltd., Johannesburg • EXPORT DEPARTMENT: New York City.

*Here is a partial list of  
**HEWITT-ROBINS PRODUCTS**  
that will help you  
cut handling costs and  
increase operating efficiency.*

### MACHINERY

Belt Conveyors  
Belt & Bucket Elevators  
Car Shakeouts  
Conveyor Idlers  
Dewaterizers  
Mechanical Feeders  
Foundry Shakeouts  
Mine Conveyors  
Reclaiming Systems  
Screen Cloth  
Stackers & Trippers  
Vibrating Conveyors & Screens

### INDUSTRIAL RUBBER PRODUCTS

#### BELTING:

Conveyor  
Elevator  
Transmission

#### HOSE:

Acid  
Air & Air Drill  
Barge Loading  
Dust Suction  
Fire  
Fuel Oil & Gasoline  
Gasoline Pump  
Mud Pump Suction  
Oil Suction & Discharge  
Propane-Butane  
Road Builders'  
Rotary Drilling  
Sand Blast  
Sand Suction  
Sea Loading  
Servall®, All-Service  
Steam  
Tank Car & Tank Truck  
Vacuum & Air Brake  
Water & Water Suction  
Welding, Twin-Weld®

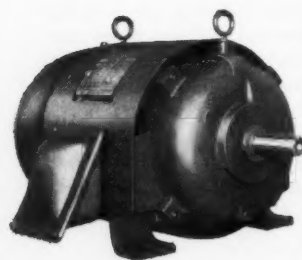
#### MOLDED RUBBER PRODUCTS

*For information and service on industrial rubber products, contact your Hewitt-Robins Industrial Supply Distributor. Through his complete stock of Hewitt-Robins Rubber Products, and his familiarity with local field conditions, he can fill your supply needs promptly and correctly. See Classified Phone Book for the Hewitt-Robins Industrial Supply Distributor serving your area.*

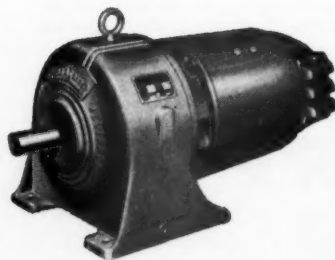
4692



# RELIANCE MOBILE UNIT



**Reliance Taconite Motor**  
Tight fits, non-magnetic seals and precision construction effectively keep out motor-killing magnetic dust. Dependable, continuous service under severe conditions is assured by this pioneering and leading motor in the taconite field.



**Reliance GearMotors**  
A compactly constructed line of gearmotors provides a heavy-duty unit for the toughest jobs. With a variety of enclosures including explosion-proof protection, gearmotors are available from 1 to 75 hp. in speeds from 7½ to 780 rpm. for both a-c. and d-c. currents.

# ON WAY TO 1954 MINING SHOW

## With Latest Developments in Motors, Controls, and Adjustable-Speed Drives ...for the Mining Industry

The Reliance Mobile Display Unit will be at the 1954 Mining Show. It will be fully equipped to provide you with first-hand information about new products for mining applications.

Action demonstrations and cutaway exhibits will clearly reveal the inherent rugged qualities of Reliance equipment that make each motor the "right motor for the job".

Reliance engineers, well versed in mining, will be on hand to discuss your applications and to assist you in acquiring greater productivity.

Reliance motors have proved themselves in the mining industry. They are used to power fans, compressors, drills, borers, loaders, continuous miners, elevators, conveyors, pullers, pumps, and other mine machinery requiring rugged service and outstanding performance.

A-1486

**Be sure to visit Booth 239... the Reliance Mobile Display Unit at the 1954 Mining Show, San Francisco, September 20-24.**



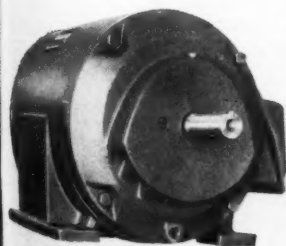
### Reliance V+S Drive

The performance-proved packaged drive which operates from a-c. circuits and provides exact control and regulation of motors for feeding, conveying, proportioning and blending, and many other mining applications requiring adjustable-speed control.

## RELIANCE ELECTRIC AND ENGINEERING CO.

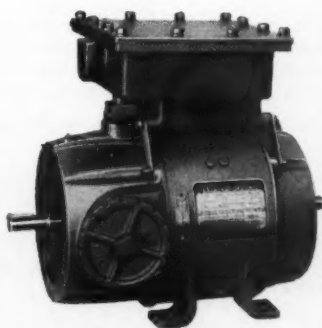
1116 Ivanhoe Road, Cleveland 10, Ohio

• Sales Representatives in Principal Cities



### Reliance Protected Motor

Built with a corrosion-resistant frame for operation in destructive environments, the Protected Motor will give outstanding performance duty on pumps, fans, compressors and other mine machines. These precision-built motors enjoy completely closed stator frames and tight fitting end-brackets.



### Reliance Special-Purpose Motor

An outstanding example of special motors is this effective combination of the toughest motor built and its starter, designed into an explosion-proof enclosure. Wide acceptance of this unit has further emphasized the expression, "All Motors are Not Alike!".

# 29 in 3 YEARS!

**SUPERIOR**  
Gyratory  
**CRUSHERS**



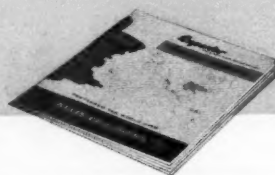
**SUPERIOR** primary and secondary gyratory crushers have been making a big name for themselves since they were introduced three years ago. Twenty-six are installed and operating... three are under construction now, including a huge 60 x 109 machine — largest crusher the world has ever known.

A policy of simplifying design and controlling quality has made Allis-Chalmers the leading builder of crushers. A continuing policy of *improving* crusher design has greatly extended this leadership.

This vast backlog of crusher application experience — over 75 years of it — is always available to you when you want to make sure of a successful installation. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4319

Superior is an Allis-Chalmers trademark.



## **NEW** 32-Page Book Contains Helpful Crushing Data

● Packed with factual "how to" information on figuring hp requirements, impact and compressive strengths.

● Step-by-step procedures for estimating gyratory crusher sizes, capacities. Examples are worked out.

● Many other valuable facts on gyratory crusher operation... application... engineering.

*It's a book you'll want to have and keep!*

# **ALLIS-CHALMERS**

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.





# THIS IS IT!

your hospitality center at the show ...



Yes, CF&I's exhibition booth will be fully equipped as a hospitality center at the Mining Show in San Francisco. There'll be everything you need to make your stay comfortable and success-

ful. Whether you want ice water, a place to sit down and relax, telephone service, or even secretarial assistance, you'll be able to get it at CF&I's hospitality center—Booths 1110, 1112, 1114, 1116.

**THE COLORADO FUEL AND IRON CORPORATION**

DENVER • OAKLAND • NEW YORK



2610

# HERE'S THE NEW LINE

## BETTER THAN EVER WITH WIDER CLUTCHES SEALED BEARINGS, HIGH-TORQUE AC MOTORS

*and many other pace-setting features*

**WIDER, LARGER CLUTCHES** Self-energizing for easy operation. Linings bear on drum hub rather than on internal clutch gear. Air space between hub and clutch gear thus effectively dissipates heat.

**MINIMUM LUBE REQUIREMENTS** Sealed bearings are used with adjacent grease reservoirs which supply additional lubricant as needed. Grease fittings are provided *only for the planetary gear train of each drum* (two fittings for two-drum slushers, three for three-drum).

**HIGH-TORQUE AC MOTORS** 500% to 620% maximum pullout torque! These motors are ideally suited for slusher service since they do not stall but merely slow down as overloads are encountered.

**FORMED SHEET-STEEL ROPE GUARDS** For safety, each drum is enclosed. These new, sheet metal guards are lighter and easier to handle than the cast-iron type. Removal is considerably simplified.

**SIZE RANGE** 15 to 75 HP. Rope pull—4,000 to 12,000 lbs.  
Rope capacity—360' of 1/2" to 450' of 3/4" rope.

## Plus THESE TIME-PROVED JOY FEATURES

- **EASE OF MAINTENANCE** Motor and both bearings can be removed intact without disturbing the grease in the gear box, transported to the shop, and overhauled without bringing the slusher above ground.
- **FLANGE-MOUNTED MOTORS** Your guarantee of ease in assembly and permanent perfect alignment.

- **SEPARATE PLANETARY CLUTCH GEARING** Gives you faster tail-rope speeds.
- **AUTOMATIC, WEIGHT-ACTUATED, BAND-TYPE BRAKES** Furnish retarding action to eliminate backlash on rope while unwinding. Are free-wheeling when winding rope on drum.

Joy Slushers are produced in over 300 types and sizes—from 3 to 150 HP. Consult a Joy Engineer for the size and type best for your scraping job. • Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.



### AMSCO SCRAPERS...

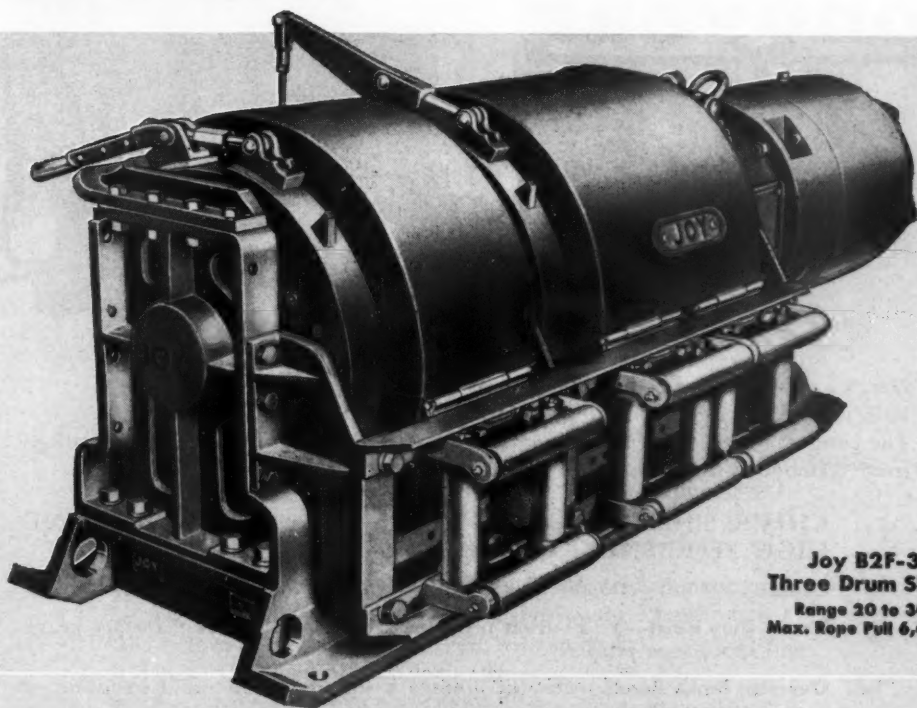
Built entirely of high (13%) manganese steel for longer life and lower maintenance. Three models—lightweight unit-type, medium weight welded-type, and heavyweight bolted-type, in sizes from 26" to 72".



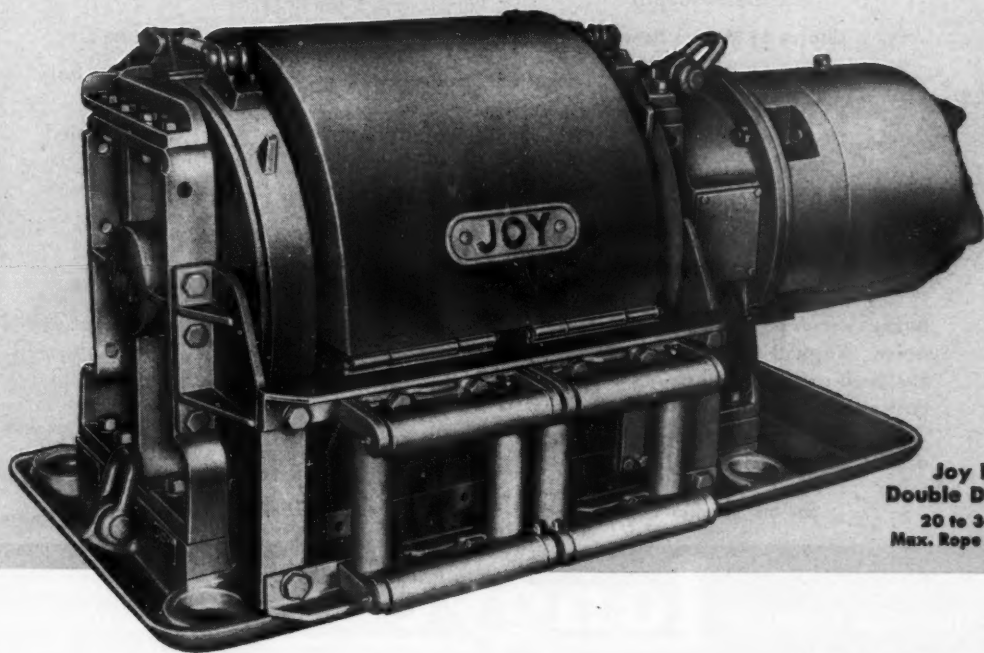
### JOY QUICK-OPENING TAIL ROPE SHEAVES...

With patented "Snatchblock" construction—sealed-for-life bearings—water-tight and dust-tight bearing seals—made of heat-treated alloy steel.

# OF **JOY** SLUSHERS



**Joy B2F-311**  
**Three Drum Slusher**  
Range 20 to 30 HP  
Max. Rope Pull 6,600 lbs.



**Joy B2F-211**  
**Double Drum Slusher**  
20 to 30 HP range  
Max. Rope Pull 6,600 lbs.

*Consult a Joy Engineer*

W&M 5227

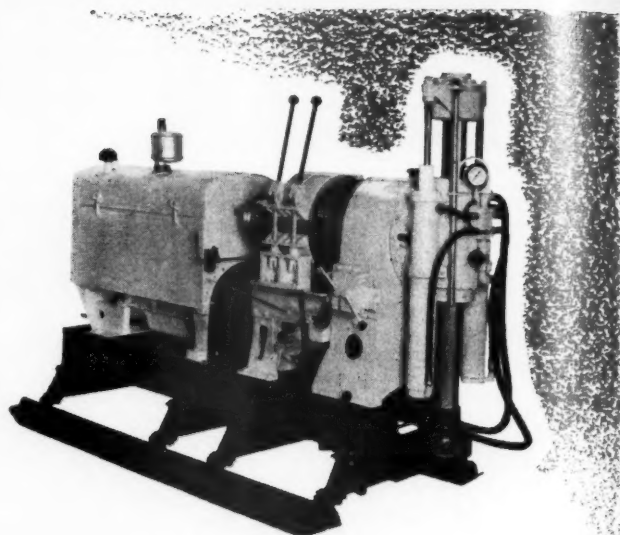


# JOY

WORLD'S LARGEST MANUFACTURER OF  
UNDERGROUND MINING EQUIPMENT



# THE GREAT NEW **Longyear** **44**



Here's a new diamond core drill, built to give outstanding drilling performance at remarkably low cost. The Longyear "44" is a *drill-runner's drill*! Its design is a result of recommendations from diamond drilling men all over the world.

## CHECK THESE FEATURES FOR SIMPLE OPERATION AND HIGH EFFICIENCY:

- ✓ **Capacity**—3000-4000 feet of "A" rods.
- ✓ **Heavy Duty Hoist**—a 13" drum provides extra capacity, uses planetary gears, will spool rope properly.
- ✓ **Oversize Brake Bands**—metallic linings assure safe and rapid handling of drill rods at depth.
- ✓ **Choice of Motive Power**—wide selection of gasoline, Diesel, electric or air.
- ✓ **Low Center of Gravity**—no danger of tipping over when moving from hole to hole.
- ✓ **New Swivel Head**—handles all sizes of rods, including 2-7/8" flush-coupled; Longyear Wire Line; and the newly adopted world standards.
- ✓ **Three-Jaw Safety Chuck**—permits use of 3-fluted Kelly for deeper holes.
- ✓ **Mounting**—available on a skid frame, or on a truck or trailer mounting.

Controls are centrally located for instant command of operation. Lubrication fittings are easily accessible for servicing. Gears are of finer pitch, to reduce drilling noise. Rugged construction assures long life and excellent service. In short, nothing has been overlooked to provide simple and efficient operation at the lowest possible cost to you.

The Longyear "44" is ready for your job. Send for Bulletin 90 to get full details and specifications.

See the "44" on display in Booth 454 at the San Francisco Mining Show

In U. S. A.  
**E. J. LONGYEAR COMPANY**  
Minneapolis 2, Minn.

# **Longyear**

In Canada  
**CANADIAN LONGYEAR LTD.**  
North Bay, Ontario

DIAMOND CORE DRILLS • CONTRACT CORE DRILLING  
GEOLOGICAL AND MINING ENGINEERS AND CONSULTANTS  
REPRESENTATIVES IN PRINCIPAL MINING CENTERS OF THE WORLD

# *for long term* PROFITS

**T**here's a stronger connection than ever between your haulage system and your long term profits! In fact, increasing costs have made maximum efficiency vital, if there are to be any profits at all!

That's just where **Q C F** Mine Cars pay off! They provide a dependable, low cost and completely flexible haulage system. Simple and rugged in design, they can be easily repaired on-the-spot—no work stoppage! Special Drop-Bottom action permits unloading at the rate of a ton a second! They do double duty—haul men and supplies in, coal out!

This is the only kind of value that pays off in today's mining operations. Let your friendly **Q C F** Representative give you the complete facts. **Q C F** Industries, Incorporated, New York • Chicago  
St. Louis • Cleveland • Philadelphia • Huntington, W. Va.  
San Francisco • Washington • Berwick, Pa.



**Q C F**  
**MINE CARS**

*for Constant Haulage*

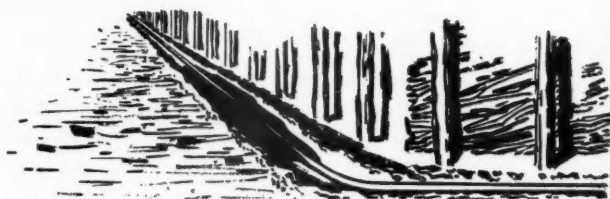
Expose it to sun and heat...



Pull it over rocks and shale...

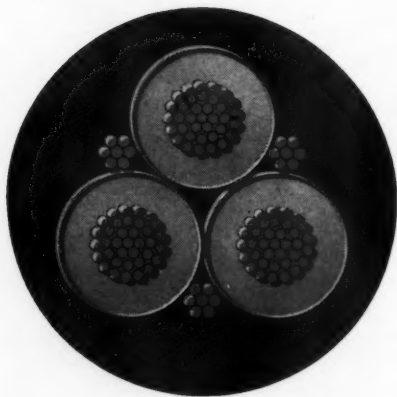


Trench it in presence of acid water...



Through it all—

## Anaconda's tough **MINE POWER CABLE** keeps power flowing



This easy-to-splice cable is built for heavy duty. It saves you money. It handles well. And it lasts longer — with fewer power interruptions, less maintenance trouble.

*Here's why:*

**BUTYL INSULATION** has high dielectric strength . . . superior long-aging characteristics . . . and excellent resistance to moisture, ozone, and heat.

**NEOPRENE JACKET** is tough . . . has real flexibility and great strength . . . and is resistant to flame and corrosive mine water.

See your nearest Anaconda Sales Office or Distributor for full information about this durable, low-cost Mine Power Cable. Do it today! *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

64340

**the right cable for the job**

## **ANACONDA<sup>®</sup> WIRE AND CABLE**

Visit Anaconda Wire & Cable Company's exhibit (Booth 915) at the Metal and Nonmetallic Mining Show, San Francisco, September 20-23.



# How **TIMKEN®** bearings help miners commute in comfort

**T**HIS Brown-Fayro Man-Car whisks miners to and from the mine face as smoothly as a commuter's special. No wonder. Its wheels roll on Timken® tapered roller bearings.

Over 500,000 coal-hauling cars roll on Timken bearings, too. Timken bearings cut costs because they:

**1. TAKE GREATER SHOCK LOADS.** Made of Timken fine alloy steel—case hardened to provide a hard, wear-resistant surface over a tough, shock-resistant core—Timken bearings can take the pounding a mine car gets.

**2. INCREASE CAPACITY.** Since loads are carried on a *line* of contact between rollers and races, Timken bearings have extra capacity.

**3. MAKE STARTING EASIER, PERMIT LONGER TRAINS.** Timken bearings' true rolling motion and smooth surface finish practically eliminate friction.

**4. SAVE LUBRICANT.** Timken bearings keep housings and shafts concentric, make closures more effective. Lubricant stays in—dirt and moisture stay out.

**5. SIMPLIFY INSPECTION.** Wheel mount-

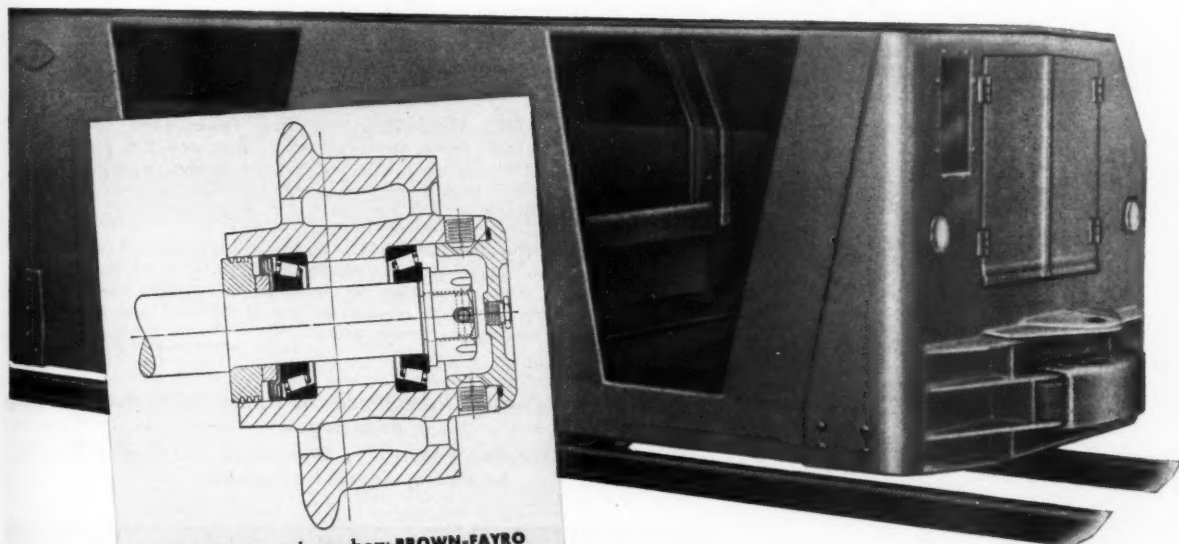
ings are simpler, you just pull cap, cotter pin and nut to inspect.

**6. ELIMINATE SPECIAL THRUST PLATES.** Timken bearings' tapered construction takes radial and thrust loads in *any* combination. Cars take curves easier.

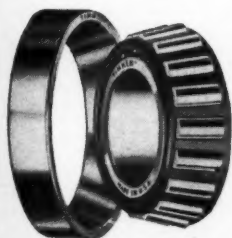
Put these advantages to work for you. Specify Timken bearings in the mining cars you build or buy. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



*This symbol on a product means  
its bearings are the best.*



This diagram shows how **BROWN-FAYRO COMPANY** mounts the wheels of its Man-Car on Timken tapered roller bearings to insure long, trouble-free operation.



**TIMKEN**  
TRADE-MARK REG. U. S. PAT. OFF.  
**TAPERED ROLLER BEARINGS**

**VISIT OUR EXHIBIT AT THE  
MINING SHOW**

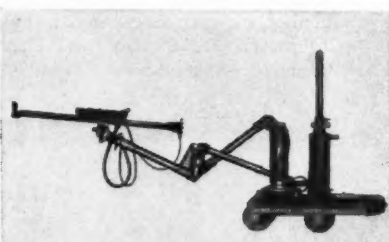
**CIVIC AUDITORIUM  
SAN FRANCISCO, CALIFORNIA  
Booth 822**

**SEPTEMBER 20th THROUGH 23rd**

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

# NEW Thor MINING

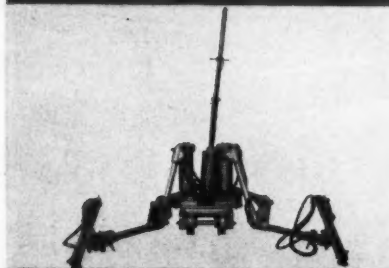
## FOR FAST LOW-COST DRILLING IN YOUR MINE...SPECIFY THOR



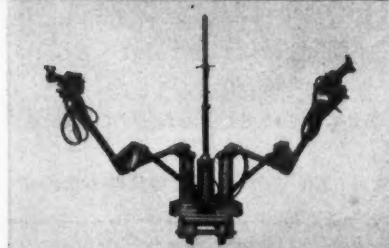
THOR SINGLE BOOM JUMBO



THOR DOUBLE BOOM JUMBO



EASIER GROUND LEVEL DRILLING



EASIER OVERHEAD DRILLING

- ✓ **COMPLETELY OPERATED BY AIR**—No hydraulics.
- ✓ **EASIEST TO SET UP**—Elimination of many time-consuming operations such as blocking, use of extension rods and constant adjustment of the jack provides faster, easier set-ups.
- ✓ **EASIEST TO OPERATE**—Horizontal swing of the boom is automatically locked by air pressure . . . and may be controlled by the operator without leaving his drilling position.
- ✓ **DRILLS ROUNDS FASTER**—When air pressure is released from the boom column . . . very little effort is required to swing the boom to a new position. Apply the air pressure and drill a new hole.
- ✓ **QUICK STEEL CHANGES**—New Thor Power Feed Drifter Mountings, with rapid advance, rapid return and full power feeding at all speeds assure fast efficient drilling, faster steel changes, fewer stuck steels, and reduces total man-hours of labor per hole drilled.
- ✓ **LOW MAINTENANCE COSTS**—Hollow boom carries all supply and control pipes, protecting them from injury. Air motor may be removed without disturbing the boom. Boom actuating screw is hermetically sealed to prevent the loss of lubricant and avoid abrasive damage by foreign matter.

**New Thor Jumbo easily disassembles to 3 parts facilitating handling in mine cages.**

**Illustrated is Two-Boom style . . . One-Boom and Special Models available, details on request.**

### SPECIFICATIONS

	1 Boom DB-100	2 Boom DB-200
Size of Chassis	18" x 35" x 80"	18" x 35" x 80"
Wheel Base	36"	36"
Track Gauges	18"	18"
Size Heading Recommended	8' Wide x 10' High	12' Wide x 10' High
Weight Bare	3600 lbs.	6000 lbs.
Crated For Domestic	3700 lbs.	6100 lbs.
Boxed For Export	4000 lbs.	6400 lbs.
Air Lines	1" Hose	1" Hose (Double)
Water Line	½" Hose	½" Hose (Double)
Boom Column Complete: Bare.....1530 lbs.		
Crated For Domestic.....1650 lbs.		
Boxed For Export.....1750 lbs.		

## NOW IN PRODUCTION

# JUMBO

DESIGNED BY THOR ENGINEERS  
IN CLOSE COLLABORATION WITH  
ENGINEERS OF THE MINING INDUSTRY

Air jack automatically compensates for rock chipping at point of contact. Eliminates constant adjustment during drilling operations. Air jack is hinge mounted to swing sidewise to engage an off-center crevice, thereby eliminating blocking.

Upper half of the jack is a telescoped hinged unit which quickly collapses and folds down for tramming. Height above rails, collapsed, is 55"—extended is 12½ ft. This is accomplished without the use of loose extension rods.

The vertical swing of the boom is actuated by an air motor which allows faster spotting and spacing of holes. The Air Motor may be removed for "top-side" service without disturbing the boom. All zerK grease fittings are recessed for added protection.

Knee type boom permits drill mounting directly over center of the boom . . . allowing entire round to be drilled without changing drill from one side of boom to the other.

Hollow boom carries all supply and control pipes protecting them from injury and freeing the operator from a major nuisance.

Vertical movement, and horizontal swing of the boom is controlled by a single valve that may be operated from either side by the operator at his drilling station.

Rear wheels are spring mounted allowing car body to set on the track when the air jack exerts pressure on the ceiling or back . . . This feature makes the car a rigid platform for the operation of the drill—eliminates time consuming clamping and blocking operations.

Boom column air piston under pressure automatically locks the horizontal swing of the boom preventing boom drift and binding during drilling operations. When air pressure is exhausted boom will swing with very little effort.

Large 14" wheels mounted on Timken Bearings for easy rolling. Wheel treads are 3½" wide to compensate for variable gauge track. Practically eliminates de-railing difficulties.

**FIELD-TESTED  
FOR  
3 YEARS**

**Thor**

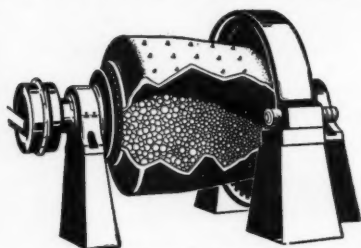
**T**HIS new Thor engineered Jumbo with simplified operating controls, is packed full of new design features . . . features that will speed your drilling operations. You can set up . . . drill a round . . . and remove this Thor Jumbo from the face in less time and with less effort than any other similar machine on the market today. Write for additional information on how this new Thor Jumbo will speed your mining operations . . . or, if you request we will send a Thor Mining Engineer to give you personal on-the-job assistance. Write Thor Power Tool Company, Aurora, Illinois.

**THOR POWER TOOL COMPANY**  
AURORA, ILLINOIS

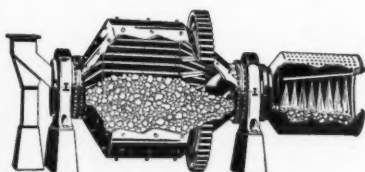
EXPORT DIVISION 330 W. 42nd STREET, NEW YORK 36, NEW YORK

# HARDINGE WILL DISPLAY MODELS AT 1954 MINING SHOW

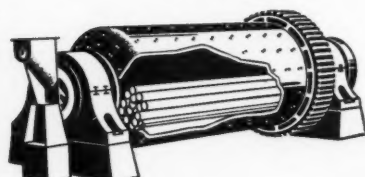
Hardinge Company, Inc., will exhibit working models of their equipment in booth No. 1124 at the 1954 Mining Show, Civic Auditorium, San Francisco, September 20-24. A glass model of the Hardinge Tricone Mill will illustrate ball segregation in this mill. The "Auto-Raise" action of the Hardinge Thickener will be demonstrated by a second model. A plexiglas model of the Hardinge Automatic Backwash Sand Filter, complete with circulatory system, will be in full operation. Also included will be an animated flow sheet and an illuminated photo background.



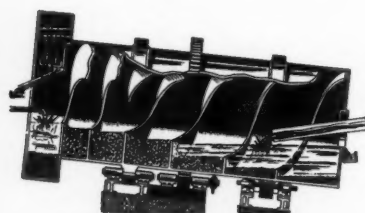
TRICONE MILLS



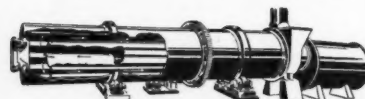
CONICAL ORE SCRUBBERS



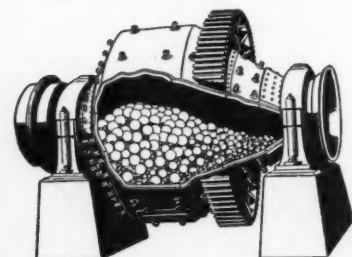
ROD MILLS



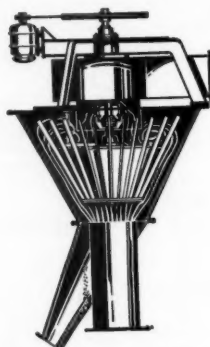
COUNTER-CURRENT CLASSIFIERS



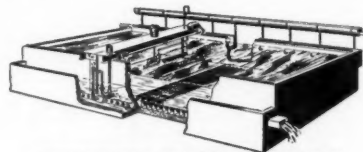
RUGGLES-COLES  
DRYERS, KILNS, COOLERS



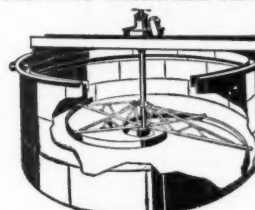
CONICAL MILLS



"GYROTOR" AIR CLASSIFIER



AUTOMATIC BACKWASH FILTERS



"AUTO-RAISE" THICKENERS

## HARDINGE PRODUCTS AND INDUSTRIES SERVED

### HARDINGE PRODUCTS

#### AGITATORS

B, C, E, G, I, K, O, P

#### CLASSIFIERS, WASHERS

(Counter Current)

A, B, C, D, E, F, G, H, I, J, K, L, M, N

#### (Rotary) CONVEYORS

A, C, E, I

#### (BLM "Auto Centre") CLUTCHES

A, B, C, D, E, F, G, H, I, J, K, L, M, N

#### DIGESTORS

O

#### "ELECTRIC EARS"

A, B, C, D, E, F, G, I, K, M, N

#### DRYERS

(Rotary)

A, B, C, D, E, F, G, H, I, J, K, L, M, N, O

#### FEEDERS

(Constant Weight, Volumetric, Belt, Volumetric Drum and Dig.)

A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P

#### FILTERS

(Sand, Circular Tank Type, A.B.W. Type)

E, G, H, I, J, L, O, P

#### (Line) HYDRATORS

C, E

#### (Vertical Line) KILNS

C

#### (Rotary) KILNS

A, B, C, D, E, F, G, H, I, J, K, L, M, N

#### BATCH MILLS

A, B, C, D, E, G, H, K, L, M, N

#### CONICAL MILLS

A, B, C, D, E, F, G, H, I, K, M, N

#### CYLINDRICAL MILLS

A, C, D, E, F, G, I, K, M, N

#### TRICONE MILLS

A, C, E, F, I, K, M, N

#### ROD MILLS

A, B, D, E, F, G, I, L, M, N

#### TUBE MILLS

A, B, C, D, E, F, G, I, K, M, N

#### (Coagulant) MIXERS

O, P

#### (Diaphragm) PUMPS

B, C, E, F, G, I, J, K, L, M, N, O, P

#### SAMPLERS

C, D, E, F, G, H, I

#### (Conical) SCRUBBERS

A, B, D, G, I, M, N

#### (Heavy Media) SEPARATORS

F, I

#### (Line) SLAKERS

E, G, L

#### THICKENERS, CLARIFIERS

A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P

### INDUSTRIES SERVED

#### ABRASIVES (Raw Product Preparation)

2, 3, 4, 6, 7, 8, 12, 13, 14, 15, 16, 17, 18, 22, 23

#### BRICK AND CLAY (Raw Materials Dig.)

1, 2, 4, 6, 7, 8, 12, 13, 14, 17, 18, 20, 22, 23

#### CEMENT, LIME, GYPSUM

1, 2, 3, 4, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 20, 21, 23

#### CERAMIC POTTERY, ENAMELS, GLASS, ETC.

2, 4, 6, 7, 8, 12, 13, 14, 15, 17, 18, 21, 22, 23

#### CHEMICAL (Heavy Chemicals, Processors, Alloys)

1, 2, 3, 4, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 20, 21, 23, 25

#### COAL & COKE (Preparation, Pulverizing)

4, 6, 7, 8, 12, 14, 15, 16, 17, 18, 20, 21, 23, 25

#### FERTILIZER (Phosphate Rock, Chemicals)

1, 2, 4, 6, 7, 8, 9, 12, 13, 14, 15, 17, 18, 20, 21, 22, 24, 25

#### FOODS PRODUCTS (Processing)

4, 7, 8, 9, 12, 13, 14, 21, 23

#### MINING, CONCENTRATING, SMELTING

1, 2, 3, 4, 6, 7, 8, 9, 12, 14, 15, 16, 17, 18, 20, 21, 22, 23, 25

#### OIL (Recovering, Refining)

8, 9, 20, 25

#### PAINT & FILLERS (Preparation of Raw Materials)

1, 2, 4, 6, 7, 8, 12, 13, 14, 15, 16, 18, 20, 25

#### PAPER AND PULP PROCESSING

2, 4, 8, 9, 12, 13, 17, 20, 24, 25

#### REFRACTORIES (Fire Brick, Silica & Special H. Temp. Brick, H. Temp. Cements)

4, 6, 7, 8, 12, 13, 14, 15, 16, 17, 18, 20, 22, 25

#### ROCK PRODUCTS (Preparation of Stone, Gravel and Sand)

2, 4, 6, 7, 8, 12, 13, 14, 15, 16, 17, 18, 20, 22, 25

#### SANITATION (Treatment of Sewage and Trade Wastes)

1, 5, 7, 8, 9, 19, 20, 25

#### WATER PURIFICATION (City and Trade Water)

1, 8, 9, 19, 20, 25

# HARDINGE

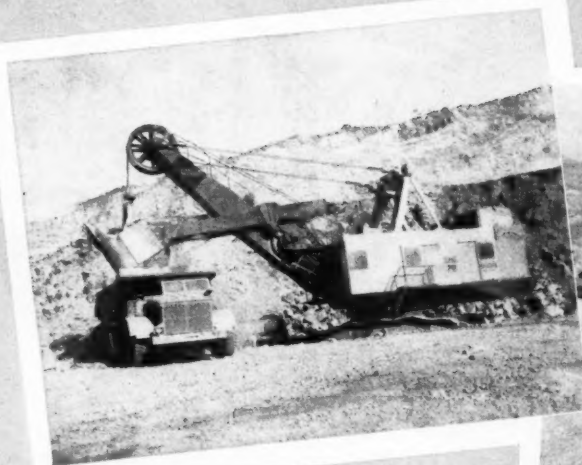
COMPANY, INCORPORATED

YORK, PENNSYLVANIA • 240 Arch St. • Main Office and Works  
New York • Toronto • Chicago • Hibbing • Houston • Salt Lake City • San Francisco



# MOUNTAIN MOVERS

## uncovering iron ore



### MARION 191-M

*The world's largest shovel on 2 crawlers*



### MARION 151-M

*Teams effectively with 25-ton trucks*

● When stripping problems take on mountainous proportions, these two MARION machines can reduce them to molehills — both as to the time and the costs involved in doing the job.

These MARION machines, shown in action at a western mine, have a steady diet of hard digging and loading. The 191-M with its 10 cubic yard

dipper loads the biggest trucks in a few fast passes. The 151-M teams efficiently with trucks in the 25-ton class.

Get the details about the records of these MARION machines, as to daily output, dependability in heavy-duty digging and operating costs. You'll see why more of the tougher jobs are being done with MARION machines.

## MARION POWER SHOVEL CO.

MARION, OHIO, U. S. A.

OFFICES AND WAREHOUSES



from ¼ to 45 cu. yds.

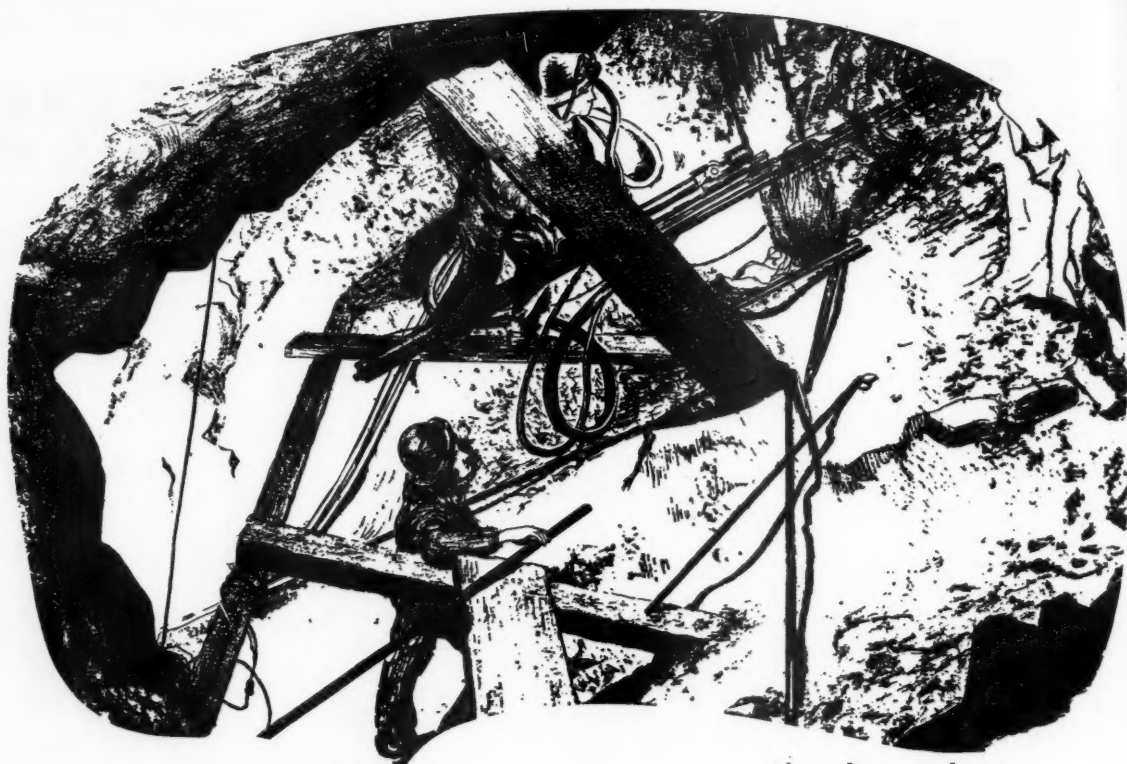
IN ALL PRINCIPAL CITIES



OSGOOD • GENERAL

A subsidiary manufactures excavating machines from ½ to 2½ cu. yds., truck cranes from 15 to 25 tons, mobilcranes from 25 to 45 tons, and log loaders.

**COME TO SEE US—Booth 614 at the Mining Show—September 20-23, San Francisco**  
**Our Convention Headquarters: Palace Hotel**



they're using  
**CRUCIBLE HOLLOW DRILL RODS**  
 at Climax



High on Colorado's continental divide, the Climax Molybdenum Company is working the largest underground mine in the United States.

As an example of the size of this operation, just one cavity — the "Glory Hole" — was made by the removal of 70 million tons of ore. And regular production will soon be at the rate of 28,000 tons of ore per day.

It's a job that demands skillful mining technique... and the best of equipment. That's why Crucible Hollow Drill Rods are extensively used. For they are produced to *tool steel standards* by the leading producer of tool and special purpose steels. To you, this means dependability — fewer broken rods and lost bits. So for *lowest cost per foot of hole drilled* specify Crucible Hollow Drill Rods.

Visit us at Booth 600

American Mining Congress Show  
 San Francisco, California  
 September 20-23



**CRUCIBLE**

first name in special purpose steels

54 years of *Fine* steelmaking

**HOLLOW DRILL ROD**

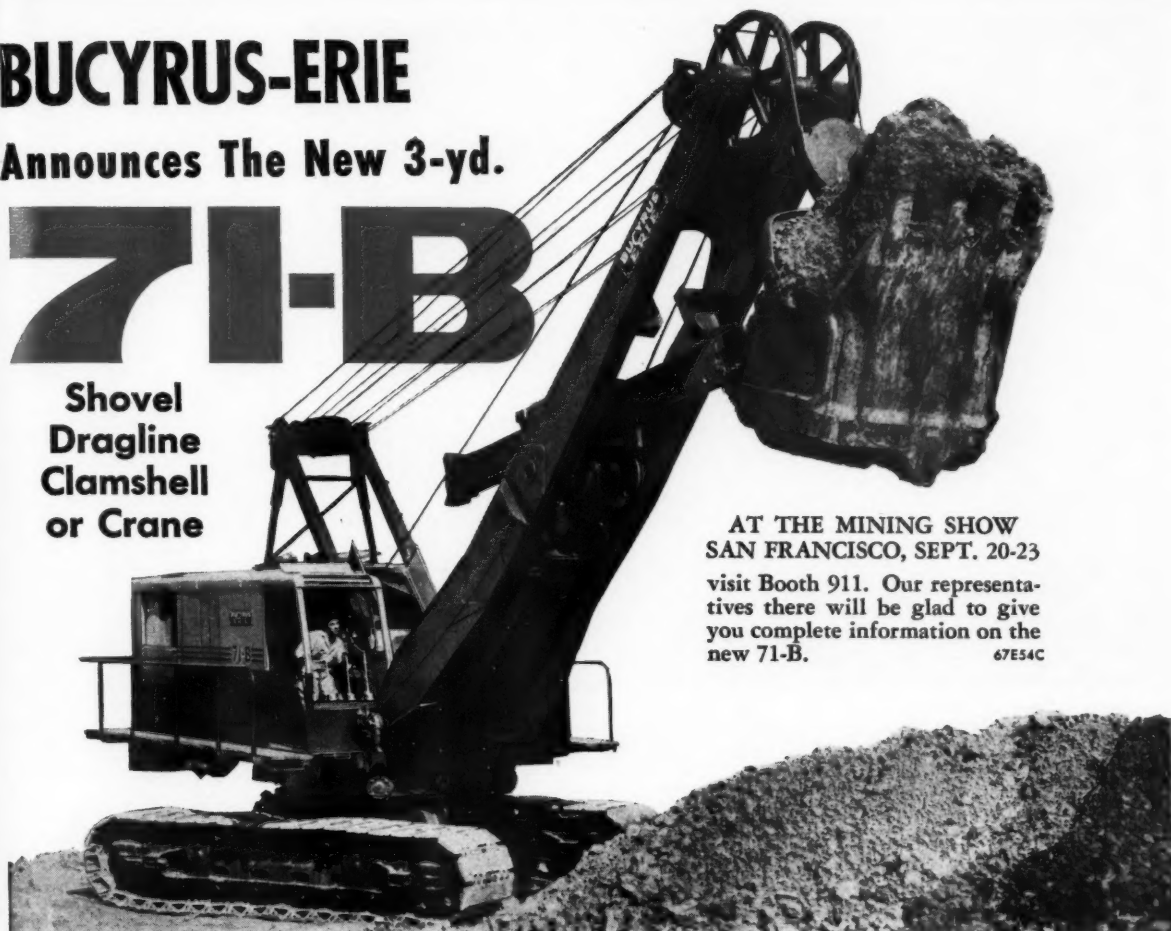
CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.  
 REX HIGH SPEED • TOOL • RESISTAL STAINLESS • MAX-EL • ALLOY • SPECIAL PURPOSE STEELS  
 Canadian Distributor — Railway & Power Engineering Corp., Ltd.

# BUCYRUS-ERIE

Announces The New 3-yd.

# 71-B

Shovel  
Dragline  
Clamshell  
or Crane



AT THE MINING SHOW  
SAN FRANCISCO, SEPT. 20-23

visit Booth 911. Our representatives there will be glad to give you complete information on the new 71-B.

67E54C

To meet the demand for a convertible 3-yd. excavator capable of high-speed, high-output performance, Bucyrus-Erie has developed the new 71-B. Designed from the ground up as a completely new machine, it has outstanding features that have been field-proved on other Bucyrus-Eries through thousands of machine-years of service.

- POSITIVE TWIN-ROPE CROWD
- RECTANGULAR INSIDE DIPPER HANDLE
- STRONG LIGHT BOOM
- FULLY INDEPENDENT BOOM HOIST
- CHOICE OF FOUR A-FRAMES
- ALL-PURPOSE HEAVY DUTY DIPPER
- FULL AIR CONTROL (not just air assist) except for drum brakes and swing and propel clutches.

- TORQUE CONVERTER DRIVE (also available without torque converter)
- ONE-PIECE CAST STEEL REVOLVING FRAME
- 12 CONICAL HOOK ROLLERS
- DOUBLE FLANGE ROLLER PATH
- ROTATABLE SWING RACK GEAR
- FOUR OPTIONAL CRAWLER MOUNTINGS
- FRICTION STEERING CLUTCHES AND DIGGING BRAKES spring set and air released.

These and other features give the new 71-B a balanced and rapid work cycle for continuous high output, along with the durability for sustained operation and long life. For more information on this outstanding new excavator see your nearby distributor.

## BUCYRUS-ERIE COMPANY

SOUTH MILWAUKEE  
WISCONSIN

### BUCYRUS ERIE



INDIVIDUAL DESIGN . . . for each model in the line

$\frac{3}{4}$ - to 4-cu. yd. gasoline, diesel, and single-motor electric . . .

Shovels, Draglines, Cranes, Clamshells,  
Dragshovels.





## THE JOB...

Strip Mining

# USE THE CABLE THAT FITS THE JOB!

## THE CABLE...

Hazacord Type SH-D Portable Cable

Ability to withstand extreme mechanical abuse and electrical stress is vital for long operational life in portable cables for shovels and drag lines. Hazacord Type SH-D Portable Cable combines the greatest electrical safety with maximum mechanical strength for long life and minimum outage in installations up to 15,000 volts.

Hazacord SH-D cables are protected by the mold-cured Hazaprene ZBF sheath with tire-tread toughness for extra mechanical strength. The copper shielding braid over each conductor, when properly grounded, equalizes electrical stresses and drains off all capacity-charging currents, insuring safety in handling. Grounding conductors in the interstices contact the copper shielding braid, providing an adequate low resistance ground for the equipment.

For information on this widely used design or on other portable cables, consult your Hazard representative or write Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.



**HAZARD**  
insulated cables

You'll find the cable to solve your job problem in Booth 2015 at the American Mining Congress' 1954 Mining Show at San Francisco. We'll be looking for you!

2137-A



## Specific Answer To Your Dragline Replacement Problem



**Tuffy Scraper Rope** Flexible enough to withstand sharp bends... stiff enough to resist looping and kinking when slack... tough enough to fight off drum crushing!

**Tuffy**

**Dozer Rope**

Mount a 150 ft. reel of  $\frac{1}{2}$ " or  $\frac{9}{16}$ " on your dozer, cut off only the sections most subject to wear, save good rope otherwise wasted.



**Tuffy Slings**

9-part, machine braided wire fabric construction so flexible that kinking or knotting does no material damage, extra strong... easy to hitch on and off.

**Tuffy**

**Slusher Rope**

An uniquely layed three strand, 19 wire rope—rigid against drum crushing, highly abrasion resistant yet flexible.



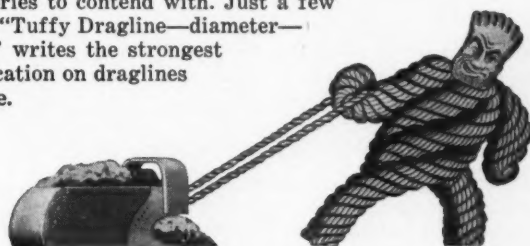
Just dragging wire rope around on the ground will wear it out in time—some kinds much faster than others even if made from the same steel.

Tuffy Dragline is constructed with large outer-wires to present a much greater wearing surface to longer withstand the severe abrasive action when dragging on and through all kinds of earth formations.

The inner structure of Tuffy Dragline is composed of smaller wires stranded and layed in such a way as to maintain the flexibility of the rope needed in casting the bucket and the strength and stamina to pull the bucket into the toughest kind of terrain and come up with a full load.

Because it is made specifically for dragline service, Tuffy Dragline will stay on the job longer, cut down frequency of replacement and downtime on a scale that is bound to help you in holding down production costs.

Tuffy Dragline is easy to order from your distributor—no complicated specifications nor involved inventories to contend with. Just a few words, "Tuffy Dragline—diameter—length" writes the strongest specification on draglines possible.



**union**

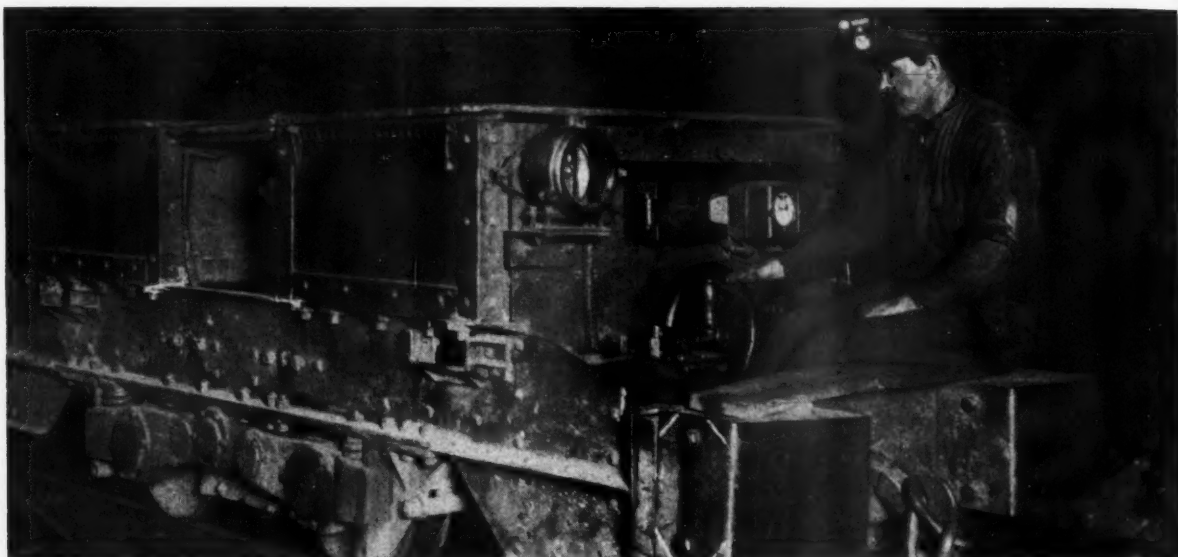


**Wire Rope corporation**

2144 Manchester Avenue Kansas City 26, Mo.  
Specialists In High Carbon Wire, Wire Rope and Braided Wire Fabric  
[ Page 31 ]

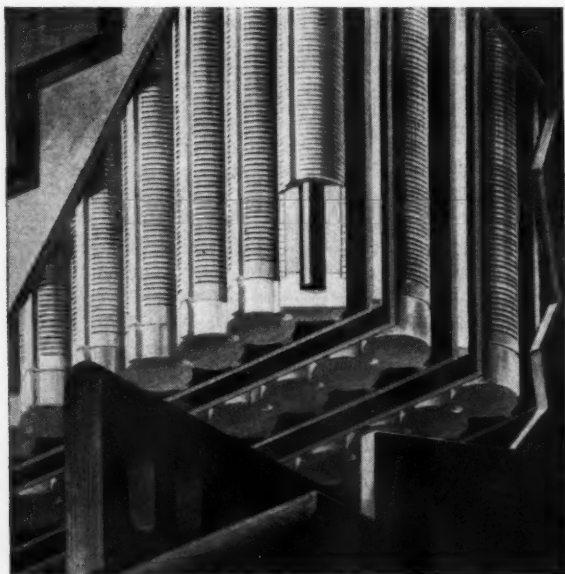
# GET FAST, UNIFORM SPEEDS ALL SHIFT LONG

*...with self-contained Exide-Ironclad battery power!*



**YOU CAN** count on Exide-Ironclads to help speed up car changes, keep loaders busy and main line haulage moving fast. This means you get more trips per shift, more production per man-hour with less cost per ton handled. Exide

powered equipment will handle as much tonnage during the last hour of the shift as during the first. Lower costs for operation, maintenance and depreciation make Exide-Ironclad batteries your best power buy—**AT ANY PRICE!**



**THE POSITIVE PLATES** are the heart of any battery. Only Exide uses a slotted tube construction. By use of tubes, more active material is exposed to the electrolyte, providing greater power. Also, more active material is retained, giving longer working life.



**THE NEW THRIFTY HAULER!** The improved locomotive battery using non-oxidizing plastic power tubes for longest battery life, more capacity in the same space. For full details, call your Exide sales engineer—write for Form 1982 (Installation and Maintenance of Motive Power).

**Your best power buy  
... AT ANY PRICE !**

**Exide<sup>®</sup>**  
**IRONCLAD<sup>®</sup> BATTERIES**

**Exide INDUSTRIAL DIVISION,** The Electric Storage Battery Company, Philadelphia 2, Pa.



# BETTER STEMMING

in Bituminous Coal Mines  
with Permissible

## Permi-Seal TAMPING PLUGS

*More than  
Pays for Itself*



**FASTER**—Cuts stemming time from minutes to seconds, increasing the efficiency of the face operation.

**SAFE**—Permi-Seal Tamping Plugs are approved by:  
U. S. Bureau of Mines; Pennsylvania Department of Mines

**SURE**—Greater confinement of the explosive charge, no overshooting with a positive seal each and every time.

**LESS COST**—One Permi-Seal Tamping Plug replaces six or more dummies—fewer units mean less carrying, less handling, less storage, less breakage, and less waste.

Check your National Mine representative today and see how better stemming with Permi-Seal Plugs *more than pays for itself!*

**National Mine  
Service Company**



**Has the  
facilities...  
Delivers the goods.**

#### EXCLUSIVE DISTRIBUTORS

**WHITEMAN DIVISION**  
Indiana, Pa. Phone: 5-5655

**BEMECO DIVISION**  
Beckley, W. Va. Phone: 7324

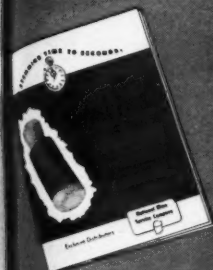
**ANTHRACITE DIVISION**  
Forty Fort, Pa.  
Phone: Kingston-Butler 7-4950

**ASHLAND DIVISION**  
Ashland, Ky. Phone: 4060

**WESTERN KY. DIVISION**  
Madisonville, Ky. Phone: 1298

**ALL-STATE DIVISION**  
Logan, W. Va. Phone: 884

**KY.-VA. DIVISION**  
Jenkins, Ky. Phone: 113



See Bulletin 534!

*Plants  
to serve you...*



# BREAKING THROUGH TO NEW HIGHS WITH THE NEW **U.S. SUPER USTEX-**

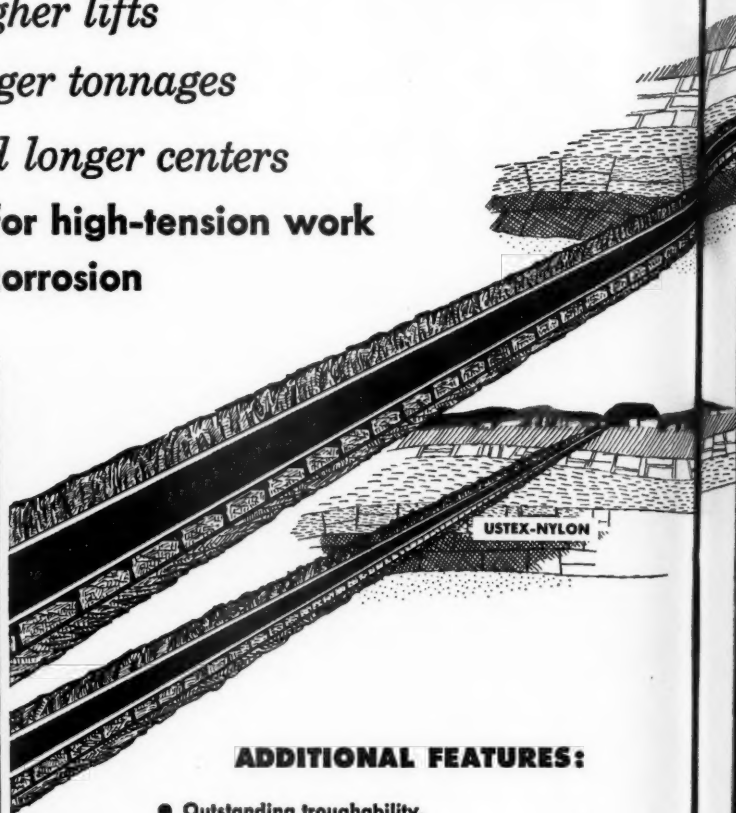
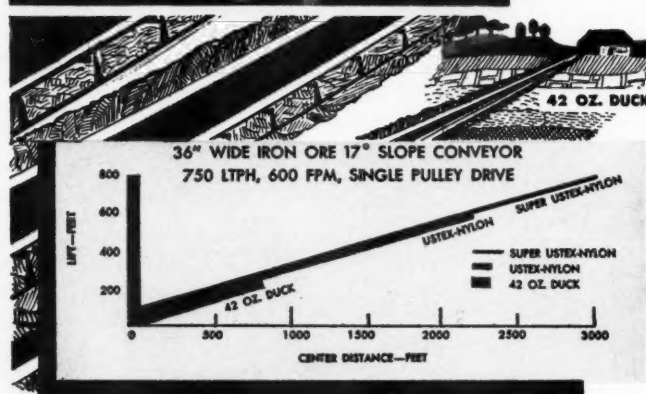
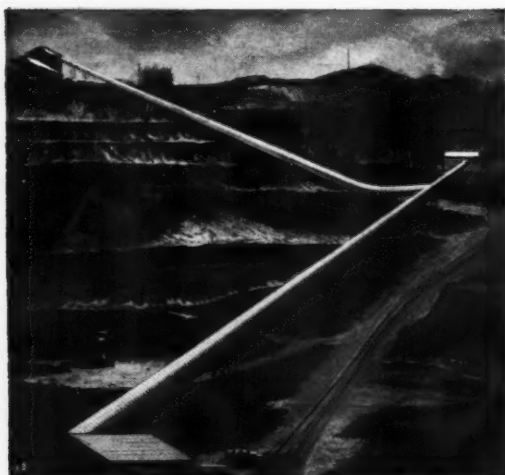
*for higher and higher lifts*

*larger and larger tonnages*

*longer and longer centers*

**The high-strength belt for high-tension work**

**— — not affected by corrosion**



## **ADDITIONAL FEATURES:**

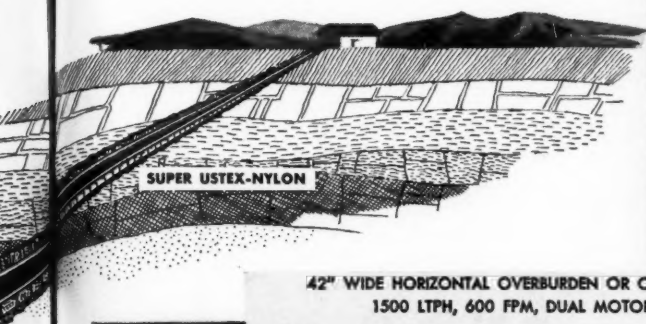
- Outstanding troughability.
- Easy training.
- High resilience dissipates shock and impact strains.
- Optimum elastic stretch.
- Homogeneous construction.
- High transverse strength, proper load support, resistance to longitudinal cuts and tears, resistance to flexing fatigue.
- Low permanent stretch.
- High safety factor.
- Easy to splice—no special skills, techniques or materials required.
- Belt tension distributed evenly through entire carcass.
- A patented construction exclusive with United States Rubber Company.
- Mildew-inhibited.



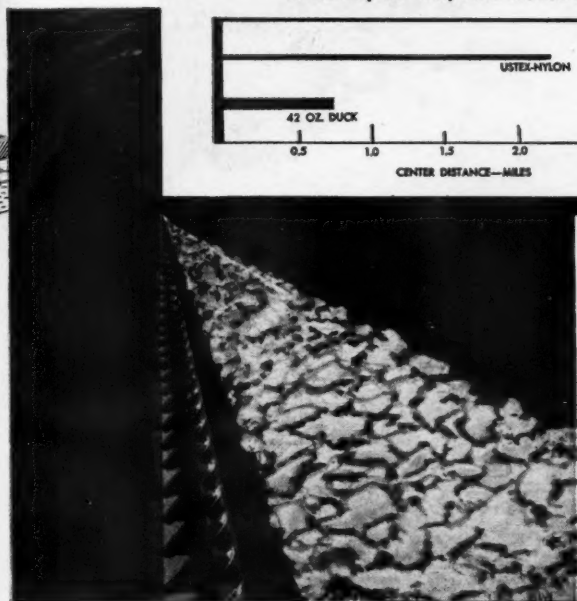
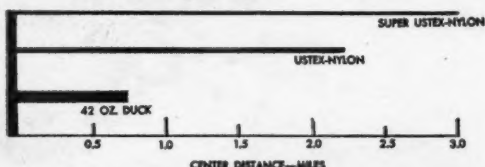
**UNITED STATES RUBBER COMPANY**

**MECHANICAL GOODS DIVISION**

# NYLON BELT!



42" WIDE HORIZONTAL OVERBURDEN OR ORE CONVEYOR  
1500 LTPH, 600 FPM, DUAL MOTOR DRIVE



This great new Super Ustex-Nylon Belt is the latest in United States Rubber Company's parade of Belt Champions.

In 1929, "U. S." gave mine haulage a history-making lift—by presenting the 42-oz. duck belt, later to become standard in the industry.

In 1939, "U. S." came out with the strongest belt ever made up to that time—the famous 48-oz. duck belt. So strong was this belt that the first one installed is still in active service.

In 1948, still anticipating that in the years ahead mine operators would find it necessary to haul ever-

increasing tonnage up higher and higher lifts, "U. S." introduced the Ustex-Nylon Belt—to handle the great tensions that were undreamed-of years before. The first of these belts was installed in a Minnesota iron mine where it carried over 7,500,000 long tons of ore at a rate of 700 long tons per hour for several years. It was then moved to a new location and now handles 1,200 long tons per hour up a higher lift. In other words, the belt is doing twice the work it was originally designed for.

And now, in 1954, again the Iron Range takes advantage of our Three-way Engineering. A leading original equipment manufacturer specifies our latest champion, the Super Ustex-Nylon Belt for one of the foremost iron ore producers.

There is always a "U. S." sales engineer ready to work out haulage problems for you through Three-Way Engineering—the "U. S." method of working with mine engineers and the designers of conveyor equipment. Consult any of the 27 "U. S." District Sales Offices, or write to address below.

*"U. S." Research perfects it... "U. S." Production builds it... U. S. Industry depends on it...*

ROCKEFELLER CENTER, NEW YORK 20, N. Y.

VISIT US AT BOOTH NUMBER 2020  
DURING THE AMERICAN MINING CONGRESS  
SAN FRANCISCO—SEPT. 20-23.

# Profits start in the Pit!



**Their dependable performance** and high job availability, combined with big payload capacity and fast travel speeds, have made "Eucs" the preferred hauling equipment for open pit mines and quarries. Because they're built for tough off-the-highway service, Euclids make more profits for owners by cutting the cost of hauling stone, ore, overburden and waste material.

Your Euclid distributor can show you the way to lower hauling costs... have him provide a hauling production and cost estimate for your operation... there's no obligation, of course, so get in touch with him soon.

**EUCLID DIVISION**  
**GENERAL MOTORS CORPORATION**  
 Cleveland 17, Ohio  
 CABLE ADDRESS: YUKLID

**There are over 1200 "Eucs" on Minnesota's Iron Ranges**—more than all other makes of off-the-highway trucks combined! Rear-Dumps, ranging in payload capacity from 15 to 50 tons, work the year around hauling ore and heavy overburden. On this tough "proving ground" Euclid performance has consistently paid off in more production and lower hauling costs.



**Working at a large open-pit copper mine in Arizona**, a fleet of 34-ton "Eucs" maintain high production at low operating and maintenance cost. Their dependable performance and high job availability make "Eucs" an important part of the profit picture on this and many other mine and quarry operations throughout the world.

CODE: BENTLEY



## Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE





**WHEEL TRUEING  
TOOL COMPANY**

3200 W. Davison Avenue  
Detroit • Michigan

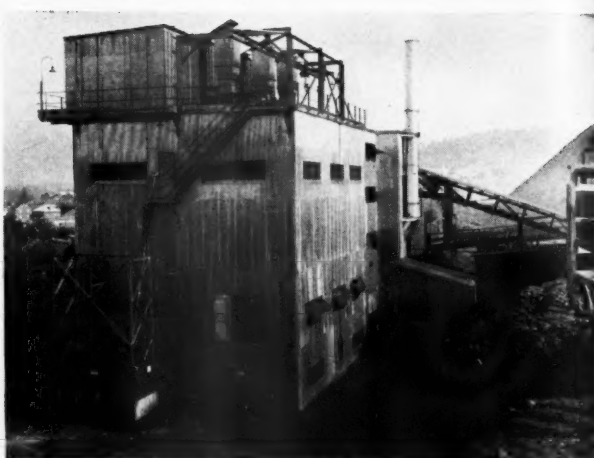
**WHEEL TRUEING TOOL CO.  
of CANADA, LTD.**

575 Langlois Avenue  
Windsor, Ont. • Canada





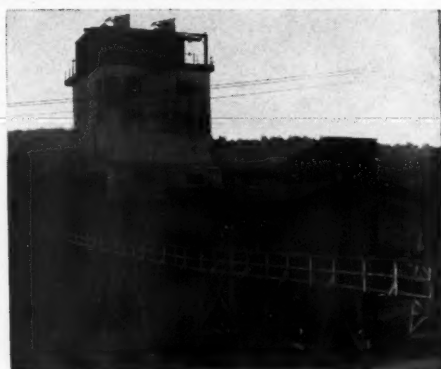
Berwind-White Coal Mining Co. Maryland No. 2 at Wilmore, Pa.



Reitz Coal Co. Mine No. 4 at Central City, Pa.



Ebensburg Coal Co. No. 1 Mine at Colver, Pa.



Johnstown Coal & Coke Co. Logan No. 3 at Beavertdale, Pa.

## SOMETHING **NEW** HAS BEEN ADDED TO 7 Central Pennsylvania Coal Preparation Plants!

Roberts & Schaefer Super-Airflow Cleaners are in daily operation in virtually every coal field. It is interesting to note, however, that Super-Airflow Cleaners were chosen independently by seven mines located within a small area of one state: Berwind-White Coal Mining Co. Maryland No. 2 at Wilmore; Reitz Coal Co. Mine No. 4 at Central City; Ebensburg Coal Co. No. 1 Mine at Colver; Johnstown Coal & Coke Co. Logan No. 3 at Beavertdale; Imperial Coal Corporation, Cambria Smokeless at Coalport and the Keystone Mine at Clymer; and Denise Coal Co. Mine No. 1 at Listie.

Only four of these modernized preparation plants are illustrated here, but they have sufficient divergencies to show that regardless of the nature of your preparation plant, R. & S. equipment can be installed without difficulty to keep it abreast of modern requirements by providing cleaner and better coal.

Features of R & S Super-Airflow Cleaners include

- consistent, efficient cleaning of a wide range of sizes—up to 1½" and larger; down to 48 mesh.
- low cost, trouble-free operation and far less maintenance even when capacities are big and sizing is not precise.
- separation of dust for recombining with clean coal when desired.

Complete process descriptions and diagrams for various sizes gladly sent upon request. Ask for Bulletin No. 175.

**ROBERTS & SCHAEFER COMPANY** 130 North Wells Street, Chicago 6, Illinois  
Air-Washing, Wet Washing and Heavy-Media Separation Equipment

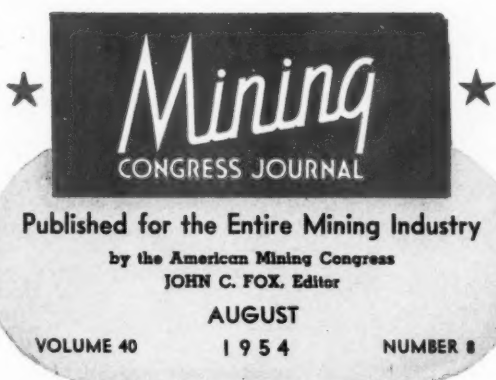
1315 Oliver Bldg., Pittsburgh 22, Pa.

P. O. Box 570, Huntington 10, W. Va.

Foreign Department: International Mfg. & Equipment Co., 220 Broadway, New York 38, U. S. A.

P. O. Box 675, Hibbing, Minn.

254 W. 54th Street, New York 19, N. Y.



## Long Live King Coal

PRESIDENT Eisenhower has appointed an inter-departmental committee to study all factors relating to our needs and supplies of major sources of energy, including anthracite, bituminous coal and lignite, as well as coke, coal tars, synthetic liquid fuels, petroleum and natural gas. This Cabinet Committee on Energy Supplies and Resources Policy, composed of the Secretaries of State, Defense, Justice, Interior, Commerce and Labor and the Director of Defense Mobilization, is to report its recommendations to the President by December 1.

Such high level consideration of the plight of the coal industry is long past due. It was heartening to read in a White House announcement relating to this Cabinet Committee that, "The defense of the Nation in wartime and the continued expansion of the United States economy in peacetime require an abundant supply of energy. The industrial progress of the United States has been marked by rapidly increasing annual and per capita utilization of energy resources." We hope this means that the Administration believes that our coal mines and coal miners (as well as lead, zinc and other vital branches of mining) are at least as important as watches and watchmakers. Their situation is certainly as critical.

Loss of domestic markets to foreign residual oil imported at dump prices; to huge quantities of natural gas, sold below its true economic value for inferior uses; loss of foreign markets because of export restrictions imposed by our own government, and an excessive freight rate structure all contribute to the straitened circumstances of our vital coal industry. These are factors within the province of the Federal Government to correct or at least alleviate.

There are other factors too, about which the industry can do something. True to its tradition it is going forward with research programs designed to improve mining methods, to prepare a better product, to provide more efficient utilization, to make coal mining safer—and it is doing this on its own.

American coal mining men have always been proud of their ability to meet any demands made on them for more coal come war or come peace. This elasticity is now endangered through circumstances beyond their control.

We urge the Cabinet Committee on Energy Supplies and Resources Policy to pursue its investigations and make its recommendations with utmost

despatch. We urge its members to consult the report of the Senate Subcommittee on Materials, Minerals and Fuels Economics. We urge them to take advantage of the findings of the President's six-man Government Committee now studying the problems of the soft coal industry. We urge them to call upon the various industry organizations and the Governor's Fuel Conference for advice and counsel.

If the Cabinet Committee on Energy Supplies and Resources Policy takes full advantage of all the informed sources available to it, there can be no doubt what its recommendations will be and Coal will continue to reign as a beneficent King to the benefit of our own and future generations.

## The Payoff

A SPECIAL section of this issue is devoted to a word picture of what is in store for mining folk in San Francisco this fall. The program for the Convention sessions is given there and the descriptions of the exhibits give a hint as to the size and completeness of this biggest of all Metal and Nonmetallic Mining Expositions.

You, or your company, will invest a considerable amount of time and money to make your attendance possible. This will be a wise investment, one that can pay off many times over during the weeks and months ahead. How big a dividend it does pay depends entirely on the individual.

The formula for maximum returns on the investment requires that each mining man choose carefully the sessions he wishes to attend and that he take part in the discussions. He should also spend all time possible in the exhibition halls. Exhibiting manufacturers have taken great pains to make it worth while for every progress-minded mining man to devote careful attention to the displays. Here he will find the latest tools and supplies of his trade. Here also trained technical representatives of each manufacturer will be on hand, ready and anxious to talk over the applications of the machinery on display or to discuss how to get the best performance out of equipment already in use.

Attendance at the general sessions will provide new insight and understanding of the problems of the Nation as they affect mining. Prominent legislators and Government officials will outline what has been done and will learn from the mining men present what further steps should be taken to preserve and enhance the production potential of American mining.

In the sessions dealing with operating problems, practical mining men will exchange hundreds of ideas on how best to find, mine and treat ferrous and nonferrous metals, industrial minerals and radioactive materials. Study the advance program and the descriptions of the exhibits. Reap the harvest of up-to-the-minute know-how, and profit by the experience of others.

September 20-24 will be the biggest week in the mining year. No mining man can afford to miss the great 1954 American Mining Congress Convention and Exposition. Four or five days attendance at San Francisco next month is worth more than four or five weeks of visiting at other mining properties. Get in on the Payoff.

# Adapting The Machine To The Man



Tillie the Toller along with four other draglines at the Bartow mine of International Minerals & Chemical Corp. have a digging capacity of over 28,000,000 cu yd per year

## Design Controls So Operator Keeps Doing What Comes Naturally and Increase Output

By THOMAS M. WARE

*Vice-President, Engineering Division  
International Minerals & Chemicals Corp.*

LOOK all about you in the mining industry. The trend is unmistakably toward higher productivity. The industry is constantly hammering at a lower unit cost—and higher productivity is the way to get it.

Of course, this may not sound any more exciting to good management than the goals it has known in the past decade—1940 to 1950—where gross national product was up 51 percent and the labor force up 13 percent, over its preceding decade. But, according to a recent survey by McGraw Hill's Department of Economics, the decade we are in now is expected to be up another 30 percent over the 1940-1950 period, with an available source of labor that is expected to be up only 11 percent.

In the face of these new figures, an expected 10 percent decrease in size of the average workweek and with the trend everywhere to more leisure, aiming for higher productivity from here on out takes on real meaning for the mining industry.

How are we going to up this productivity? There will be more mine mechanization, much larger mining equipment with greater capacities, and the equipment investment per miner will go up.

Rule-of-thumb planning will be discarded in favor of scientific planning. There will be bigger inroads into mining methods by improved mining technology. There is lots of room for brand new ideas vastly different from the design thinking grooves to which we've been accustomed. Better recovery of ores will have to be made, safer equipment design will be required, and improved human relations will have to be realized. Modern mine management knows these are the principles by which productivity is increased; that it's unrealistic to expect people to become tougher—to expect miners to revert to the "good old days" where a man was reputed to have put out more brute force, and to have worked longer hours.

In this decade we have fallen heir

to the results of some mighty wonderful planning seeded in the past decade. Manufacturers supplying the mining and construction industries have made outstanding contributions. Several promising underground continuous miners have been produced, the jumbo drill is coming into its own, conveyors are seeing broader application, and machinery in general has been improved upon to establish new production records in many industries.

### Bigger, More Complex

While there will be new concepts of mining equipment design every year, the really basic, big equipment designs that we know now will be with us for a long time. The design improvement trends here will be toward even greater capacities, heavier construction and increasing complexity as we delve into ways and means of increasing mine productivity.

All of this spells higher capital costs per unit of mine equipment and a trend towards increased technical ability on the part of the mining machine operator.

Did you ever stand next to a continuous mining machine and feel the power and responsibility of the operator as you watched it chew and rip its way through the mine face? Did you ever stand behind the operator of a mammoth dragline and watch him move earth with a 26-yd dragline bucket at the end of a "fragile" 235-ft boom (or a 40-yd bucket on a 100-ft



boom)? Locomotives, shuttle cars, universal undercutters, 600-hp hydraulic pumps, 50-yd twin-engined scrapers with 400 hp, and 30 mph trucks with 10-ft diam wheels all have the same effect. It's hard to realize that this equipment is destined to become more productive.

Present types of large mine equipment are so complex that it takes quite a time to properly train the operators. It's no pick and shovel routine. The miner's usefulness has been up-graded. It's becoming evident, too, that there are some top operators, and some who are all thumbs and may never make a go of it. With larger capital expenditures the rule, it's beginning to look as though we can't afford not to be selective in choosing operators for this equipment, is coming to the fore front. Yet, even if we should get more selective, it's a real responsibility to get maximum capacity throughout a shift—to keep this high capital cost equipment paying off at the rate intended.

### New Perspective

Because of this kind of thinking, at the Bartow mines of International Minerals & Chemical Corp., we have felt that it's time to consider adapting the machine to the man, rather than the man to the machine.

We looked upon the responsibility of the dragline operator as being sizable. First, in terms of the cost of the tool he was given to work with—around \$1,000,000. Then we looked at his performance responsibilities—typically, a multimillion-dollar plant that must be fed 24 hours a day at a fairly uniform rate, with as few hitches as possible. Then there is a

tremendous orebody from which we wanted to pull out every yard of matrix we could find. Finally, we dwelled upon the consequences of failure of this important link in our operating system. Ultimately, we concluded that the increments of efficiency of the whole system rested, with sizable leverage, upon the way the dragline or any part of the system many work. From the dragline operator's point of view, he could be considered to have responsibility for performance in a business that was quite highly capitalized. Not only that, but literally each yard of product mined went through his hands, and he had more control over ore recovery than any other single person. The company's three primary draglines handle about 28,000,000 cu yd of overburden and phosphate rock a year on about a 1:1 ratio, dig a depth of 20 to 40 ft.

### No Supermen

Now, of course, a dragline operator is no special breed of man, a kind of tin god in this system of mining. Anyone with normal physical attributes can operate one of these machines quite satisfactorily. What should be emphasized, however, is that the facilities given any man to perform his job should be adapted to him. All the information he needs to determine how well he is doing his job should be at his finger tips. He should have built into his work place whatever is necessary for him to do his best at all times. And he should have as much fineness of control as can be properly placed at his disposal.

With this outline in mind, we decided it was time to adapt the machine to the man. We decided to make the

principal operator's job easier for him, to reduce the need for a high degree of physical selectivity. Psychologists, experts in bio-mechanics, were brought in and we took our dragline control center apart. Dunlap and Associates of Stamford, Conn., worked with us on this. They had given this kind of attention to aircraft cockpit design, to submarines and to other similarly complex equipment. They had men literally living with, eating with and following the operators on their schedules around the clock. The dragline operators were the "experts," but they were busy men too. In blending with them the specialists much more was learned about the complexity of their operation than had been known before—all from their point of view, but backed up with scientific rationale.

The results of this study were rough on those of our staff who, as practical engineers, had to design and produce a modified cab system. But it all made common sense, so the company took the plunge and made an entirely new dragline control center. It is a dream and very practical. In spite of the usual resistance to new ideas that was expected, habit patterns were easily changed, and in less than three weeks the machine was up to capacity operation.

### Bad Habits

Some of the new operating habit patterns were quite different. One incident will explain how logical and natural these changes were. The drag control had always been placed in the operator's left hand. Believe it or not, it had been the custom to wire this control so that as you pushed the control lever forward you caused the bucket to move (toward the operator), pulling it back caused it to move out (away from the machine). When the new cab was put into use, we had to talk out the advisability of changing the direction of control in the old cab if we were to make comparative use of both cabs (we now have two cabs on our dragline). The old cab is now changed in favor of the bio-mechanics' concept of what is natural and everyone is happy, but it was a moment for testing our new thinking on principles of design.

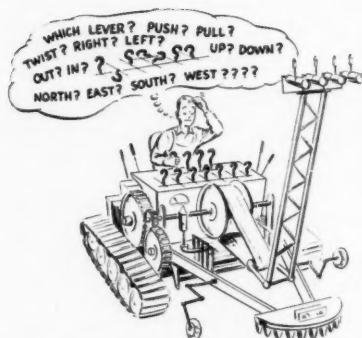
Summarizing, the more notable of the design innovations in this new control center are wrapped up in three main groups: improved visibility, improved cab (control housing and environment) design, and improved controls and layout.

**Improved visibility** was obtained by relocating the cab, and freeing the important lines of sight from structures interference, by special design of the windshield arrangement. **Improved cab housing and the operator's inside environment** was secured by considering such things as illumination, air conditioning (summer



Important control information is placed at the operator's finger tips. Improved and simplified controls make the job easier, safer and more productive





and winter operation), color, noise and temperature insulation, seating, windshield washers and wipers, and other miscellaneous operator comfort needs.

**Improved controls and layout** were realized through first, a wholly different concept of controls; secondly, an arrangement to see that the proper information was right at the operator's finger tips; and thirdly, that the controls were adapted to conform to proper human coordinating patterns. Principal among the innovations contributed by this work are: the joystick type of control in the right hand for combining the hoist and swing motions to free the feet. The control pedestals not only have novel controls, but contain prime control indicating devices. The balance of the reporting instruments and least used controls are grouped on a panel using a special arrangement.

### Many Helped

There have been several others who have helped do this work. General Body Co. of Chicago built the cab housing. W. F. & John Barnes of Rockford, Ill., the people who produce those fantastic new automatic machine tools for the automotive manufacturing industry, designed and built the controls and panel system. And last but by no means least, we had a general mining superintendent who was progressive, capable, and willing to give this thing more than just a try—Cap Tillotson, head of the IM&C Florida mining operations.

It isn't often that a mining company can afford to go off on its own on equipment design. However, if the stakes are high enough, and you believe strongly in the ultimate benefits, you do it knowing that you are bound to get a good return for your efforts.

In the case of new mine equipment just hitting the drawing boards, manufacturers can and should give more thought to the operator. Individually, most mining companies may not be able to spend the time and money necessary to carry out control center redesign—which ultimately benefits

the whole industry. But that doesn't mean that the manufacturer should fail to understand the need for these improvements. Individually, the mining companies need the benefits of increased productivity. Manufacturers should help them to get these benefits, spreading development costs over more machines, sold to many. Of course, there's no objection to the manufacturers doing their own development work in this field to create sales preference for their own equipment.

### Buy 1954 Productivity

Our management is out to buy productivity, isn't yours? And don't think that the boss's Cadillac has power steering, automatic window defrosters, windshield wipers, automatic shifting, windshield washing devices, comfortable seating with finger tip seat control adjustments, automatic windows, increased visibility, soundproofing, no glare windshields, and air conditioning, all because he doesn't recognize their value. These features sell cars, and they can sell mining equipment too. What boss wants to go back to the Model T, any more than he wants to buy the hardest operating equipment he can lay his hands on just for the sake of price alone?

That this trend of design—to adapt the machine to the man—is a well recognized and accepted principle for increasing efficiency and, hence, a sales advantage is evident in the home kitchen, the airplane cockpit, the machine tool industries, and the process industries, as well as in the family car. Smart management is paying more attention to its people, accepting any new ideas that will help increase productivity. A few examples chosen at random may well illustrate this point:

The machine tools in a modern auto parts manufacturing plant can produce fantastic production quantities, but they do it with streamlined operator work centers.

The chemical processing industry is cutting down on its valve twiddlers in favor of centralizing its instruments and push button controls in one central control room where intelligent operating decisions can be made using all the facts at the operator's command. A process sheet is spelled out on the control panel and related measuring instruments are shown in their proper place on the chart. There are devices to simulate visually the degree to which a tank is filled, how fast a pump is going, the direction of flow when a valve is turned, and where each piece of equipment is located in such simulated characteristic form that you can tell at a glance.

To show how the chemical and refining industries feel about instrumentation and control; three to four percent was allowed for this in new plants built just prior to World War II. Now eight to ten percent is being allowed for control and instrumentation. The instrument industry has trebled its size in the last 15 years.

### Place Your Bets

At the Cleveland meeting of the Sixth Annual AIEE Special Conference on machine tools, on the subject "Economics of Location of Control Devices on Machine Tools," Messrs. Compton and Dyer include this interesting note: "The allowance for fatigue is reduced 40 percent when the operator is seated." This paper goes on to cite the main areas of consideration when designing the work place for modern high-speed machine tools, and it winds up with a three page



The man who operates a \$1,000,000 machine should be given every tool possible to enable the most efficient use of the machine



Remote hoist control center gives operator clear view of shaft hoist and dumping operations. Note simplified desk type control console

bibliography that would convince anyone to use human factors for design of machine tools. Mining machinery isn't so different from machine tools. Wouldn't you want to bet that a comfortable seating arrangement for the operator of mining machinery (where possible) is worth the same 40 percent increase in productivity to the mining machine as is reported for machine tooling?

All through the machine tool industry the subject being talked about today is automation. It gets back to the operator eventually, and has the effect of up-grading him, to the point where he plays a more important part in the machine's full utilization. More thought is given to his work place. He's a more valuable part of the system than he used to be.

A long list of other comparisons could be made, but once you get to feeling this way almost any number of such comparisons from other producing industries will stand out.

There are important trends in man-machine design showing up in several places in the mining equipment manufacturing field. These show notable advances in a better understanding of the man-machine relationship.

International Minerals & Chemical Corp. recently installed a new remote control hoist house at its No. 1 shaft at Carlsbad, N. M. The operator has been brought down from his traditional high pedestal up in the "crow's nest" of the hot, noisy, oily hoisting machinery and put outside where he can command a full view of the top-side end of the shaft and operations there. The desk-type console and controls is quite an improvement and shows a much better understanding of the operator's job and his responsibilities. Norberg Manufacturing Co. originated the desk console design and

it is becoming standard design practice for many hoists.

### Stutz Bear Cat Controls

Link-Belt Co. advertises that you can "Boost your production as much as 25 percent" and authenticates the claim with a graph showing actual fatigue measured worker performance for its "51 series shovel-cranes," using a new type finger tip control. Link-Belt takes pride in dropping the old Stutz Bear Cat manual control lever system with the descriptive line under this graph explaining that the lower performance curve "... approximates the penalty you pay for operating fatigue . . ." These curves clearly show the daily operator fatigue pattern, how it drops off severely at the end of the day with old type controls. Production goes right down with fatigue.

There are several design methods now employed by manufacturers who recognize the value of simplified multiplying type controls. Whether you use air, hydraulic or electric means for ease of control, this design step in itself is a big one and worth a lot in terms of productivity. But to realize the maximum possibilities of such controls the control device itself needs scrutiny. This year, 1954, shows the best operator cockpit designs to consist of a rack of push-pull levers in front of the operator, all commanding great power. From here on, we need to be moving in search of further machine-to-man adaptation.

### Plain Confusing

Let's be specific about this newer area of opportunity for more control improvement. While we have 1954 equipment designs that provide finger tip control, and manual ease, are the

control devices themselves quite natural? Typically, in all of the newest mining equipment which the writer has seen, with rare exception, the controls themselves consist of a rack of levers that bear little motion or appearance relationship to the action they cause. If you want to swing a machine left or right, you are probably confronted first, with a selection of many levers; secondly, they all look alike; and finally, you find that you must push or pull to get the machine to go left or right.

The newest jumbo drill units undercutting machines, underground conveyor loaders, road scrapers, continuous mining machines and even the small, highly flexible shovels, draglines and cranes, all have the same standard multiple lever control confusion.

### Safety—Without Thinking

Couldn't the manufacturer-designer, for next year's equipment, borrow a page from the aircraft design handbook? Here you will find that all controls are not the same and that every control is of different shape, color, arrangement and its action is characteristic of what it does. There's no confusing row of levers to choose from. This contributes to passenger safety. If wheels are to be lowered, there's a lever that has a small wheel for a knob, it's bright, neon-red plastic, and it is pushed down, not sideways across the panel. If flaps are to be lowered, there is a small wedge-shaped knob to be pushed down, and chances are it is painted aluminum, typical of control surface color. Throttle levers always move forward to pick up on engine power.

All of these design principles and many more are not limited to aircraft use, they're too basic and fundamental to any control design if we can but give a little time to think it through.

*It's just this simple:* An operator can operate large, expensive mining machinery, getting more production, if his control system simulates as closely as possible the desired control action. The operator will be a safer operator, his mental processes won't get tangled up doing what doesn't come naturally.

### Need to Pause

It must be repeated that the writer has sincere respect for the seemingly fantastic design and manufacturing achievements in all large present day mining machinery. This paper is intended only to call attention to a need for a pause; to use perspective as we design for newer, larger, more complex mining machinery; to re-evaluate the part of the man in the man-machine system; and to contribute thereby to the higher productivity goals of the mining industry.



Battery locomotives shuttle one car at a time to the loading machines

## Mining At Perry Coal Co.

**Strip Miners Take Over Deep Mine and in Three Years  
Build Production Up to More Than 650 Tons Per  
Machine Shift**

By GEORGE W. SALL

THE St. Ellen mine of the Perry Coal Co. is located near O'Fallen, Ill., about 17 miles east of St. Louis. Opened in 1903 as a shaft mine, it taps the rich Illinois No. 6 coal seam and is one of the oldest operating mines in the state. Coal averages 78 in. in height and there is from 180 to 210 ft of cover.

In 1950 Midwest Radiant Corp. purchased the operation. Until that time, Midwest has confined its activities to strip mining. Since its entrance into deep mining, however, mine management has proved that the move was a good one. The "strip miners" brought ideas and conceptions that have paid off in a profitable coal producer.

At the present time, mining is be-

ing done in old blocks. As soon as these workings are "squared away", the mine will begin working in virgin coal. Mining is by the room and pillar method. Two 14 to 16-ft entries are driven on 40-ft centers to open up each panel. Rooms, turned right and left on 80-ft centers, 45° from the entries, are driven 24 ft wide and breakthroughs are on 60-ft centers, parallel to the panel entries. Pillars are not mined. Area recovery runs about 60 percent. Production is high. During May 1954 it averaged almost 679 tons of clean coal per machine shift.

Right now there are four track sections working single shift. In time of greater coal demand, the sections are worked double shift. When double

shifting, the second shift does not follow the first shift directly. There is a four-hr break between shifts to allow the coal to be shot. Illinois Mining Law requires shooting with explosives be done off-shift.

### Good Conditions

Mining conditions are good. In fact they are so good that mine maps show rooms were driven as wide as 100 ft in the early days. That is not to say that the top does not need to be supported. It does, and roof bolting is practiced throughout the mine. In some areas there is a weak "clod" about six in. thick that miners feel is most treacherous as it falls without warning. To pin this material to the stronger secondary roof, short (18-in.) bolts are used. Roof bolts are recovered wherever possible.

Because all shooting must be done off-shift, a large number of working places have to be available to each loader. Mine management believes that 28 places per loading machine is the ideal arrangement at St. Ellen. With, say, 24 places shot down at the beginning of each shift, the loading machine is assured enough coal for the shift, even if some of face preparation



equipment breaks down during the shift.

### Use Large Crews

The great number of working places needed for each machine coupled with the fact that on-track mining is practiced necessitates large crews. Average crew size is 19 men and a boss; broken down as follows:

- 1 Section foreman
- 1 Loader
- 1 Loader helper
- 2 Cutters
- 2 Drillers
- 2 Shot firers
- 2 Motormen
- 1 Trip rider
- 2 Roof bolters
- 5 Trackmen
- 1 Mechanic

Two of the trackmen do nothing but pull and lay switches. The shotfirers report to work late and stay in after the shift is finished to shoot coal for the next shift. During the regular shift they load and tamp each place as it is prepared, leaving the shots to be connected up later. Delay shooting is practiced, which means that the shots in each face are connected in series and fired at one time.

Coal is loaded with Goodman loading machines into bottom dump cars. Capacity of these cars averages 6.6 tons of clean coal. Places are cut with Goodman cutting machines about 35 in. off the bottom. Track-mounted twin-boom Chicago-Pneumatic drills are used to drill the coal. At the present time the company is using three Jeffrey roof drills and one Joy in their bolting program.



To minimize delays, a spare loading machine is kept in each section

### Haulage Is Impressive

Perhaps the most impressive feature of the entire mine is the haulage system. The main line haul to one mining area is 5½ miles and to the other, 3½ miles, one way. In each area there are two mining sections. Two 20-ton Goodman locomotives are used for main-line haulage. From the main-line parting, eight-ton Goodman motors shift empties in to the section and loads out. These are called "relay" motors and one is assigned to each section. At the face there are two battery locomotives to each section, shuttling one car at a time to the loading machine.

To best describe the haulage cycle, let's start with a loaded, out-bound trip. Generally each main-line motor comes out with 28 loads. The trip is pulled into the bottom and over the

dump. After 14 cars have been dumped, the motor disconnects and moves through a run-around to the tail-end and then pushes the rest of the trip through. This break allows the hopper, which has a 350-ton capacity, to clear itself in case it has been filled by the first half trip. As soon as the loads are dumped, the main-line motor heads back inside with the 28-car trip, now empty. All trips are under control of a dispatcher who is in contact with his motormen, the bottom and each section, by trolley phone.

At the main-line parting inside, the motorman drops his trip of cars in the empty side track and picks up a trip of loads on the loaded track. If all is going well, the relay motors have assembled 28 loads and the main-line motor can move right out.

From the parting the relay motors each pick up seven cars and take them into one of the two sections served by the parting. Here they drop the empties and wait for a trip of seven loaded cars to take back out.

### Battery Locos At Face

On section the haulage crew is made up of two motormen and a trip rider. Each battery locomotive handles one car at a time. Let us follow the haulage cycle at the face starting with one locomotive and a car at the loading machine and the other standing with an empty at the first switch outby. The trip rider is standing at the switch. When the car under the boom is loaded, the motorman pulls away and through the switch. If the trip rider has to throw the switch for the motor with the empty, he does, and then rides out with the load which is added to the trip that the relay motor will later pick-up. After dropping the loaded car the locomotive moves over to pick up an empty and then returns to the first switch outby the loading machine. Here the trip rider leaves the



Roof bolting is practiced throughout the mine





Dust from the cutting machines is controlled by water from accompanying tanks

empty to go back with the other motor when its car is loaded while the second motorman pushes his empty up to the loading machine.

The haulage schedule calls for seven loaded cars to be moved from each section to the main-line parting every half hour. When delays interfere with this schedule, the main-line motor will pick up a short (21-car) trip and take it to the bottom. The next time around a 35-car trip will be ready and the haulage is again back on schedule. A round trip can be made in 45 min on the 5½-mile haul and each main-line motor averages seven trips per shift.

As mentioned earlier, an average of almost 679 tons of clean coal per machine shift was mined in May of this year. The actual work-day at the face is seven hr. This would mean that a car was loaded every 4.1 min on an average. Each loading machine loaded 103 cars and 15 trips were made by the main-line motors every shift during the month. These figures are averages, of course, but show how well the haulage system is laid out and how efficiently it is run.

### Track Maintenance

On the main line, 60-lb track is used while 40-lb iron is used in the sections. Every working shift two men maintain and extend main-line track. Five trackmen are employed in each section.

On the off-shift, two men clean track with a "Canton" Track Cleaner. These same men do the rock dusting throughout the mine.

Miners are represented by the Progressive Mine Workers of America. Their contract with the mine operators states that the wage scale is based on seven hrs' work at the face including a paid 15-min lunch period and includes travel time. To assure maximum production during the shift, the miners do not take any regular lunch period. Rather, they eat their

lunches during periods when doing so does not interfere with the seven-hr continuous production of coal. For doing this they are paid time and a half for an extra 15 min at the face. Thus, a face crew spends its entire time at the face, in productive work.

### Spare Loaders On Section

To assure that coal loading is not interrupted by mechanical delays, a spare loading machine is kept on each section. In addition, there is a mechanic with each crew. When the new owners took over the property, one of the first things they did was to take out one loading machine at a time and overhaul it. Machines were torn completely down and carefully rebuilt. Each unit of the loader was tested in the shop as it was assem-

bled to insure its proper functioning. This rebuilding program paid off, as delay time has been kept to a minimum.

Between shifts a crew of two men greases all face equipment. When the mine is operating two shifts per day, two crews are used because the short span between shifts will not allow one crew to get to all of the equipment.

### Lubrication Important

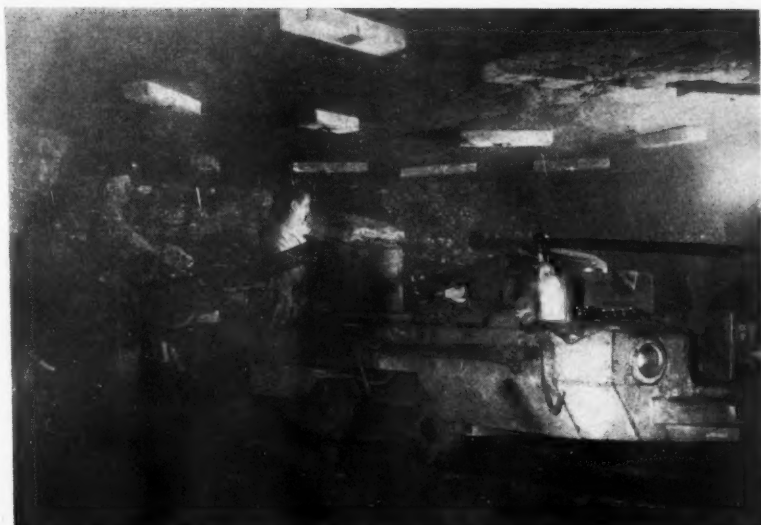
A grease car has been developed to make the lubrication job easier. The car carries three steel tanks; one each for high-pressure grease, hydraulic fluid and oil. Two lubricant pumps, one each in the grease and oil tanks, feed lubricants to 50 ft of delivery hose held by spring-actuated automatic-retracting reels. Air pressure—high pressure to the grease pump and low pressure to the oil pump—is furnished by a 14-cu ft air compressor. At the present time, hydraulic fluid is carried by hand from the tank to the mining machine, but present plans are to install a pump in the hydraulic tank also. The use of high-pressure greasing assures that all fittings are properly greased and speeds up the greasers' work. At the end of every shift, the section foreman gives the grease crew a list showing the location of each piece of equipment on the section.

When the mine is working two shifts and there are two lubrication crews, one uses hand equipment and the other the lubrication car. The two crews then alternate sections to assure that each piece of equipment is pressure-lubricated every other shift.

St. Ellen is one of the few mines in



A stacker pile acts as surge capacity and allows the cleaning plant and mine to work independently of each other



Roof bolts are used throughout the mine. They are recovered from mined out areas

the United States operating with reversed polarity. Ac power is purchased and brought into the mine through boreholes. Motor-generator sets convert the ac to 250 v dc for use in the mine.

### Slope Haulage

In late 1948 and early 1949 a slope was put down at St. Ellen close to the shaft. A 42-in. belt was installed to carry coal from the bottom to the existing cleaning plant. The belt is also used to carry men going on and coming off shift. Two motors, one 200 hp and the other 50 hp, are connected in tandem to drive the belt to the surface. The 200-hp motor, operating at a speed of 1700 rpm, drives the belt when coal is being carried. Belt speed with coal is 400 fpm. Belt speed with men is 200 fpm. The 50-

hp motor is used when men are being carried.

Before the slope and belt was installed, it took 25 min to put men underground through the shaft. Now the same job takes six min. An electric eye is located at the top and bottom of the slope to protect men riding in either direction. If a man should pass the unloading station, the belt is automatically stopped. Also, a safety line runs the length of the belt. One pull on the line and the belt stops.

From the 350-ton hopper at the bottom of the slope, coal is fed onto a 42-in. belt by a vibrating feeder for transportation to the cleaning plant. The slope conveyor is 740 ft from tail to head pulley and rises on a 16° pitch.

At the top of the slope coal can be handled in two ways. It either goes

directly into the cleaning plant or is diverted to a stacking conveyor for storage on the surface. In this way the cleaning plant and the mine can operate independent of each other.

Three thousand tons of raw coal can be put on the stacker pile which feeds back to the slope conveyor through a glory hole. A tractor dozer is used on the pile to push coal into the glory hole from the outskirts of the pile.

In the cleaning plant all plus six-in. feed is crushed to minus six in. and run back in with raw coal. At the present time all coal is washed in a Jeffrey, three-compartment, Baum jig. However, a Roberts and Schaefer air cleaner is being installed to handle the 3/8-in. by 0 coal in the future.

Since coal has to be supplied to some of the company's customers on a seven-day-a-week basis and much of the business is seasonal, an average of 17,000 tons of clean coal is carried in storage. The bulk of this coal is 1 1/4-in. by 28-mesh washed screenings.

### Credit Due Management

Mining at Perry Coal Co. is under the direction of Oliver M. Evans, vice-president, W. R. Winters, general superintendent and Joseph Johnson, mine superintendent. John Harvey is chief engineer. Maintenance is taken care of by Charles Patton, chief electrician, and Kenny Davis, assistant chief electrician. Fighting the battle of production underground are R. M. Meeks, mine manager, and Joe Cruse, second shift mine manager.

Production is still inching up. Records are constantly being set and then bettered. However, the battle is getting tougher. As one member of the management team put it, "We were saving hours, now it is a fight to save minutes." But they have the conditions and are doing the most with them.



An average of 17,000 tons of clean coal is carried in storage to take care of seasonal demands and seven day-a-week customers



## Plans for AMC Convention and Exposition in September Take On Final Shape

FROM September 20 to September 24 several thousand mining men and their ladies will attend the American Mining Congress' great 1954 Metal and Nonmetallic Mining Convention and Exposition. Most of the activities will take place in San Francisco's Civic Auditorium, where 29 general and operating sessions, special conferences and committee meetings have been scheduled.

Spread out over the Convention week, these sessions have been arranged to provide the minimum conflict of interest, and to allow a maximum opportunity for convention goers to examine and study the greatest exposition of machinery and supplies ever assembled at one of these meetings.

The National Program Committee headed by Frank R. Milliken, vice-president, Kennecott Copper Corp., has invited some 150 outstanding speakers to address the Convention. Leading mining men, legislators and Government administrators will exchange informa-

tion and discuss the country's problems as they affect its basic industry, mining, in the frank and open atmosphere that pervades all Mining Congress meetings.

Among those who will take part in the convention proceedings are: Senators William F. Knowland and Thomas H. Kuchel of California, Pat McCarran of Nevada, Wallace F. Bennett of Utah, George W. Malone of Nevada and Francis Case of South Dakota; Congressmen A. L. Miller of Nebraska, Clair Engle of California, Harris Ellsworth of Oregon, John J. Rhodes of Arizona, Wingate H. Lucas of Texas, Thomas E. Martin of Iowa, John W. Byrnes of Wisconsin and Hale Boggs of Louisiana.

Other State and Federal Government officials on the program include: Governor Goodwin J. Knight of California; Governor J. Bracken Lee of Utah; Assistant Secretary of the Interior Felix E. Wormser; Edward Woolley, Administrator of the Bureau of Land Man-



★  
State and District Chairmen



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ROBERT W. HUGHES  
Arizona



GORDON I. GOULD  
California



MAX W. BOWEN  
Colorado



F. E. BURNET  
Montana



A. E. MILLAR  
Nevada

(Photo Not  
Available)

CHAS. E. SCHWAB  
Idaho



HENRY H. BRUHN  
New Mexico



FAY I. BRISTOL  
Oregon



A. H. SHOEMAKER  
South Dakota



CLAUDE O. STEPHENS  
Texas



WALTER C. PAGE  
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Tri-State & Miss.  
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Lake Superior  
District



D. S. MACBRIDE  
Eastern States



RALPH K. GOTTSALL  
Manufacturers



FRANK E. WILLIAMS  
National Chairman  
Program Committee

*Program*  
**COMMITTEE**



agement; Commissioner of Internal Revenue T. Coleman Andrews; Edward C. Crafts, Assistant Chief, U. S. Forest Service; E. H. Weaver, Assistant Director, Office of Defense Mobilization, Jesse C. Johnson, Director, Raw Materials, U. S. Atomic Energy Commission, and Canada's Deputy Minister of Mines, Marc Boyer.

In addition to sessions devoted to trends in Washington, labor and personnel problems and public relations, public lands, tariff, taxation, stockpiling, government mineral programs, gold, silver and monetary policy, and other public questions, several sessions will be given over to the Uranium industry and its problems—economic, legislative and operating. Other sessions have been designed to cover the exploration, development, mining, beneficia-

tion and extraction of metal and nonmetallic minerals, from A to Z.

The full agenda for the Convention, together with the names of the speakers, is reproduced on pages 52 to 57. Even a quick glance at these pages cannot help but impress the reader with the scope of the program and the high caliber of the men who are taking part.

### To Draft Policy Declaration

Western Division Chairman Donald H. McLaughlin, president of Homestake Mining Co., has appointed a nationwide committee to draft a Declaration of Policy for the Convention's consideration. This will present the industry's views on national issues of concern to mining. Kenneth C. Kellar, Attorney, of Lead, S. D., has been named Chairman of

## WESTERN DIVISION

### THE AMERICAN MINING CONGRESS

DONALD H. McLAUGHLIN, Chairman  
President, Homestake Mining Co.

#### BOARD OF GOVERNORS

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WILLIAM C. BROWNING, Western Repr., Gold Fields American Development Co.  
HAROLD L. CHILDRESS, Gen. Mgr., Buffalo Mining Co.  
G. F. COOPE, Pres., Potash Co. of America  
J. D. CRAWFORD, Vice-Pres. & Gen. Mgr., Alaskan Operations, U. S. Smelting Refining & Mining Co.  
KUNO DOERR, JR., Mgr., East Helena Plant, American Smelting & Refining Co.  
E. B. DOUGLAS, Gen. Mgr., Calera Mining Co.  
T. O. EVANS, Chief Mining Engr., Atchison, Topeka & Santa Fe Rwy. Co.  
WRAY D. FARMIN, Dir., Pend Oreille Mines & Metals Co.  
LOUIS D. GORDON, Exec. Secy., Nevada Mining Assn.  
A. C. HARDING, Gen. Mgr., Black Hills Bentonite Co.  
ROBERT M. HARDY, Pres., Sunshine Mining Co.  
ROY A. HARDY, Consulting Engr. in Charge, Getchell Mine, Inc.  
ROBERT W. HUGHES, Vice-Pres. & Gen. Mgr., Miami Copper Co.  
JOHN J. INMAN, Dist. Mgr., American Zinc, Lead & Smelting Co.  
ELMER ISERN, Miami, Okla.

OSCAR H. JOHNSON, Pres., Iderado Mining Co.  
J. C. KINNEAR, JR., Gen. Mgr., Nevada Mines Div., Kennecott Copper Corp.  
W. C. LAWSON, Asst. Gen. Mgr., Phelps Dodge Corp.  
F. W. LIBBEY, Dir., Oregon State Dept. of Geology & Mineral Industries  
HARRY W. MARSH, Secy., Idaho Mining Assn.  
ROBERT S. PALMER, Exec. Vice-Pres., Colorado Mining Assn.  
ERNEST N. PATTY, Pres. & Gen. Mgr., Alluvial Golds Inc.  
J. B. PERRY, Mines Development Mgr., Westvaco Chemical Div., Food Machinery & Chemical Corp.  
L. F. PETT, Gen. Mgr., Utah Copper Div., Kennecott Copper Corp.  
BEN D. ROBERTS, Mgr., Southwestern Dept., American Smelting & Refining Co.  
MILES P. ROMNEY, Mgr., Utah Mining Assn.  
A. H. SHOEMAKER, Gen. Mgr., Homestake Mining Co.  
E. H. SNYDER, Pres. & Gen. Mgr., Combined Metals Reduction Co.  
CHESTER H. STEELE, Vice-Pres. in Chg. Western Operations, Anaconda Copper Mining Co.  
CLAUDE O. STEPHENS, Vice-Pres., Texas Gulf Sulphur Co.  
R. J. STOEHR, Mgr., Bald Mountain Mining Co.  
JOS. H. TAYLOR, Vice-Pres., Peru Mining Co.  
CARL J. TRAUERMAN, Secy. & Treas., Mining Assn. of Montana  
CHARLES F. WILLIS, State Secy., Arizona Small Mine Operators Assn.  
S. H. WILLISTON, Vice-Pres., Cordero Mining Co.  
W. L. ZEIGLER, Gen. Mgr., Pend Oreille Mines & Metals Co.

### General Committee



**WORTHEN BRADLEY**  
Co-Chairman



**ALBERT F. KNORP**  
Vice-Chairman



**G. S. BORDEN**  
Vice-Chairman

### Publicity and Attendance



**P. R. BRADLEY, JR.**  
Co-Chairman



**S. H. WILLISTON**  
Co-Chairman



**L. T. KETT**  
Co-Chairman



**JACK H. HOW**  
Co-Chairman

### Welcoming

### Trips



**H. A. SAWIN**  
Co-Chairman



**MAX F. HOLSINGER**  
Co-Chairman



**MRS. F. R. GIRARD**  
Honorary Chairman

### Ladies



**DONALD H. McLAUGHLIN**  
Chairman  
Western Division  
General Chairman

## Arrangements COMMITTEE

(Photo Not  
Available)

**MRS. P. R. BRADLEY, JR.**  
General Chairman

this Resolutions Committee. Under his leadership a number of subcommittees are drafting the proposed planks of the platform on which mining will take its stand during the coming year.

To make sure that each resolution reflects the views of the entire mining industry, Chairman Kellar requests that mining men submit

their comments and suggestions for the attention of the Committee. These may be in the form of proposed revisions or amendments to the declaration adopted at Seattle last year (see the November 1953 JOURNAL, pp. 51-56) or they may include views on any other topics on which mining men feel the industry should take a public stand.

(Continued on page 58)



**William F. Knowland**  
U. S. Senator from  
California



**Thomas H. Kuchel**  
U. S. Senator from  
California



**Goodwin J. Knight**  
Governor of  
California



**George W. Malone**  
U. S. Senator from  
Nevada



**Wallace F. Bennett**  
U. S. Senator from  
Utah



**Pat McCarran**  
U. S. Senator from  
Nevada



**Francis Case**  
U. S. Senator from  
South Dakota



**A. L. Miller**  
Congressman from  
Nebraska



**Clair Engle**  
Congressman from  
California



**Harris Ellsworth**  
Congressman from  
Oregon



**John J. Rhodes**  
Congressman from  
Arizona

## Convention Program

**MONDAY, SEPTEMBER 30**

**9:00 A.M. REGISTRATION, CIVIC AUDITORIUM**

**9:40 A.M. PRE-SESSION MOTION PICTURE—"Operation Ivy"**  
—The First H-Bomb Explosion.

### 10:00 A.M. Opening Session

**Presiding:** DONALD H. McLAUGHLIN, *Pres.*, Homestake Mining Co., San Francisco; Chairman, Western Division, A.M.C.

#### Welcome to California

MAYOR ELMER E. ROBINSON of San Francisco  
HON. GOODWIN J. KNIGHT, *Governor of California*

#### Responses

HOWARD I. YOUNG, *Pres.*, American Zinc, Lead & Smelting Co.; President, American Mining Congress  
FRANK R. MILLIKEN, *Vice-Pres.*, Kennecott Copper Corp.; National Chairman, Program Committee  
RALPH K. GOTTSHALL, *Pres.*, Atlas Powder Co.; Chairman, Manufacturers Division, A.M.C.  
DONALD S. MACBRIDE, *Pres.*, Hercules Cement Corp.; Director, America Mining Congress

#### Introduction of Distinguished Guests

### "Trends in Washington"

**Presiding:** HOWARD I. YOUNG, *Pres.*, American Mining Congress

#### The National Legislative Scene

HON. WILLIAM F. KNOWLAND, *U. S. Senator from California*; Senate Majority Leader

#### The Road Ahead

HON. THOMAS H. KUCHEL, *U. S. Senator from California*

#### National Mineral Policies

HON. FELIX E. WORMSER, *Assistant Secretary of the Interior*

#### Reports of Resolutions Committee:

General Policy  
Government Reorganization

\* \* \*

**1:40 P.M. PRE-SESSION MOTION PICTURE—"California and Its Natural Resources"**

### 2:00 P.M. Labor and Personnel Problems; Public Relations

**Chairman:** ROY H. GLOVER, *Vice-Pres. & Gen. Counsel*, Anaconda Copper Mining Co.

#### Needed—A New Look For Our Labor Law

HON. WINGATE H. LUCAS, *U. S. Representative from Texas*

**Discussion:** DENISON KITCHEL, *Attorney*

#### Employe Relations; Selection of Supervisors

EDWIN R. HENRY, *Employe Relations Dept.*, Standard Oil Co. (N. J.)

#### Public Relations for the Mining Industry—

A "Grass Roots" Task

MILES P. ROMNEY, *Mgr.*, Utah Mining Assn.

#### Encouraging Students to Enter Mining

M. P. O'BRIEN, *Dean*, College of Engineering, University of California

#### Reports of Resolutions Committee:

Labor Relations—Mine Safety



Wingate H. Lucas  
Congressman from  
Texas



Thomas E. Martin  
Congressman from  
Iowa



John W. Byrnes  
Congressman from  
Wisconsin



Hale Boggs  
Congressman from  
Louisiana



Felix E. Wormser  
Assistant Secretary  
of Interior



J. Bracken Lee  
Governor of  
Utah



I. Coleman Andrews  
Commissioner of  
Internal Revenue



Edward Woozley  
Admr., Bureau of  
Land Management



Edward C. Crafts  
Asst. Chief,  
U. S. Forest Service



E. H. Weaver  
Asst. Dir., Office of  
Defense Mobilization



Jesse C. Johnson  
Dir., Raw Materials,  
Atomic Energy Comm.



Marc Boyer  
Deputy Minister of  
Mines, Canada

1:40 P.M. PRE-SESSION MOTION PICTURE—"In the Beginning"  
—The Story of the Grand Canyon

## 2:00 P.M. Geology and Exploration

**Chairman:** RODGERS PEALE, *Cons. Geol.*, San Francisco

### Modern Exploration Methods

ELDON GILBERT, *Gen. Mgr.*, Cordero Mining Co.

### Geochemical Prospecting

KONRAD KRAUSKOPF, *Professor of Geochemistry*, Stanford University

**Discussion:** T. S. LOVERING, *U. S. Geological Survey*

**Geophysical Exploration and Development of the Pima Mine**  
ROBERT E. THURMOND, *Supt. of Mines*, Pima Mining Co., and

### Exploration of Riddle Mountain Nickel Deposit

A. E. WALKER, *Geol.*, The M. A. Hanna Co.

**Discussion:** SALEM RICE, *California Division of Mines*

## 2:00 P.M. Round Table Conferences

**Tungsten—Chairman,** CHARLES H. SEGERSTROM, JR.,  
*Pres., Nevada-Massachusetts Co.; Pres., American Tungsten Producers Assn.*

**Chrome—Chairman,** FAY I. BRISTOL, *Pres., Bristol Silica Co.*

**Asbestos—Chairman,** JACK L. NEAL, *Vice-Pres., Metate Asbestos Corp.; Secy., Arizona Asbestos Producers Assn.*

7:00 P.M. "Chuck Wagon Dinner"—  
Palace of Fine Arts

TUESDAY, SEPTEMBER 21

9:40 A.M. PRE-SESSION MOTION PICTURE—"Oregon and Its Natural Resources"

## 10:00 A.M. Public Lands Panel

**Chairman:** HON. A. L. MILLER, *U. S. Representative from Nebraska; Chairman, House Interior and Insular Affairs Committee*

HON. CLAIR ENGLE, *U. S. Representative from California*

HON. JOHN J. RHODES, *U. S. Representative from Arizona*

HON. HARRIS ELLSWORTH, *U. S. Representative from Oregon*

HON. EDWARD WOOLEY, *Director, Bureau of Land Management*

EDWARD C. CRAFTS, *Asst. Chief, U. S. Forest Service, U. S. Dept. of Agriculture*

RAYMOND B. HOLBROOK, *Counsel, Western Div., U. S. Smelting Refining & Mining Co., Salt Lake City; Chairman, Public Lands Committee, A.M.C.*

CLAIR M. SENIOR, *Attorney, Salt Lake City*

WILLIAM G. WALDECK, *Attorney, Montrose, Colo.; Chairman, Colorado Plateau Uranium Committee*

C. JAY PARKINSON, *Attorney, International Smelting & Refining Co.*

STEPHEN L. R. McNICHOLS, *Gen. Counsel, Uranium Ore Producers Assn.*

HON. EDWIN J. REGAN, *State Senator, California*

### Reports of Resolutions Committee:

Public Land Policy

Water and Air Pollution

(Continued on next page)



# PROGRAM *(Continued)*

## TUESDAY, SEPTEMBER 21 (Cont.)

9:40 A.M. PRE-SESSION MOTION PICTURE—"The Drama of Portland Cement"

### 10:00 A.M. Nonmetallic Minerals

**Chairman:** OLAF P. JENKINS, *Chief*, California Division of Mines

#### Introductory Review of Nonmetallics

HENRY MULRYAN, *Pres.*, Sierra Talc & Clay Co.

#### New Uses for Phosphates

J. G. MILLER, *Mgr.*, Sales Development, Westvaco Chemical Div., Food Machinery & Chemical Corp.

#### Cement Industry of the West Coast

ROBERT A. KINZIE, JR., *Supt.*, Santa Cruz Portland Cement Co.

#### Lightweight Aggregates of the West

CHARLES W. CHESTERMAN, *Assoc. Mining Geol.*, California Division of Mines

#### Concrete Aggregates in Northern California

EDWARD L. HOWARD, *Physical Testing Engr.*, Pacific Coast Aggregates, Inc.

#### Nonmetallic Minerals for the Chemical Industry of the West

FRED LOHSE, *Asst. to Vice-Pres.*, Kaiser Aluminum & Chemical Corp.

#### Ceramic Uses of Talc

RICHARD S. LAMAR, *Research Dir.*, Sierra Talc & Clay Co.

#### Geology of Talc

LAUREN A. WRIGHT, *California Division of Mines*

#### Olivine in Manufacture of Refractories

W. F. ROCHOW, *Asst. to Pres.*, Research and Development, Harbison-Walker Refractory Co.

9:40 A.M. PRE-SESSION MOTION PICTURE—"Treasure Islands"

### 10:00 A.M. Drilling and Blasting

**Chairman:** J. B. HAFFNER, *Pres.*, Bunker Hill & Sullivan Mining & Concentrating Co.

#### Airleg Drilling Compared With Other Methods

HARRY L. MILLER, *Asst. Supt. of Mines*, American Zinc Co. of Tennessee

#### Symposium on Longhole Drilling

L. T. POSTLE, *Vice-Pres. and Gen. Mgr.*, Granby Consolidated Mining, Smelting & Power Co.  
E. H. LOVITT, *Pres.*, Lovitt Mining Co., Inc.  
C. M. BECK, *Asst. Gen. Mgr.*, Algoma Ore Properties Ltd.

#### Rotary Drilling in Hard Rock

TELL ERTL, *Chairman*, Dept. of Mining & Petroleum Engineering, Ohio State University

1:40 P.M. PRE-SESSION MOTION PICTURE—"Nevada and Its Natural Resources"

### 2:00 P.M. Stockpiling; Tariff; Government Mineral Programs

**Chairman:** ENDICOTT R. LOVELL, *Pres.*, Calumet & Hecla, Inc.

#### Mobilization Policies in Relation to Mining

E. H. WEAVER, *Asst. Dir. for Materials*, Office of Defense Mobilization

#### The Tariff Question

O. R. STRACKBEIN, *Chairman*, The Nationwide Committee of Industry, Agriculture and Labor on Import-Export Policy

**Discussion:** JEAN VUILLEQUEZ, *Vice-Pres. and Dir. of Sales*, American Metal Co., Ltd.

#### Minerals and Western Hemisphere Defense

HON. GEORGE W. MALONE, *U. S. Senator from Nevada*; *Chairman*, Senate Economic Subcommittee on Minerals, Materials and Fuels

#### Minerals—Backbone of National Security

HON. THOMAS E. MARTIN, *U. S. Representative from Iowa*

#### Report of Resolutions Committee:

Stockpiling and Tariff Policies

1:40 P.M. PRE-SESSION MOTION PICTURE—"A is for Atom"

### 2:00 P.M. Uranium Exploration and Development—Colorado Plateau

**Chairman:** GLOYD M. WILES, *Mgr.*, Mining Dept., National Lead Co.

#### Controls That Affect Uranium Ore Deposition

**Structural Controls:** E. V. REINHARDT, *Hunt Oil Co.*

**Lithologic Controls:** ROBERT J. WRIGHT, *Chief*, Geology Branch, Exploration Division, AEC

#### Airborne Prospecting for Uranium

ROYAL S. FOOTE, *Chief*, Geophysical Exploration Branch, Division of Raw Material, AEC

**Discussion:** WALT BILICKE, *Pres.*, Engineers Syndicate, Ltd.

#### Calculation of Uranium Ore Reserves

H. R. WARDWELL, *Mining Geol.*, Exploration Division, Ore Reserve Branch, AEC

#### Estimation of Uranium-Vanadium Reserves

A. L. BUSH and H. K. STAGER, *U. S. Geological Survey*

1:40 P.M. PRE-SESSION MOTION PICTURE—"Copper Mining in Northern Rhodesia"

### 2:00 P.M. Underground Mining Methods

**Chairman:** HENRY H. BRUHN, *Resident Mgr.*, United States Potash Co.

#### Underground Operations at White Pine

H. B. EWOLDT, *Vice-Pres.*, White Pine Copper Co.

#### Mechanical Material Handling Cuts Costs

H. H. WELLS, *Supt.*, U. S. and Lark Mine, U. S. Smelting Refining & Mining Co.

#### Ore Transport—A Panel Discussion

Experience with various means of underground haulage—rail, conveyor, shuttle-cars, trucks, etc.  
E. H. MILLER, *Asst. to Mgr.*, U. S. Potash Co.  
H. A. LONDON, *Supt. of Maintenance and Construction*, Duval Sulphur & Potash Co.  
G. A. GORDON, *Gen. Mgr.*, Canadian Exploration Co.  
H. E. PRUNER, *Sales Mgr.*, Conveyor Belts, U. S. Rubber Co.  
J. H. EAST, JR., *Regional Dir.*, Region IV, and  
D. S. KINGERY, *Chief*, Haulage Safety Section, U. S. Bureau of Mines

#### EVENING—NO SCHEDULED ENTERTAINMENT

WEDNESDAY, SEPTEMBER 23

9:40 A.M. PRE-SESSION MOTION PICTURE—"Gold and Man"

#### 10:00 A.M. Taxation; Gold, Silver and Monetary Policy

##### Tax Panel

HON. T. COLEMAN ANDREWS, *Commissioner of Internal Revenue*  
HON. WALLACE F. BENNETT, *U. S. Senator from Utah*  
HON. THOMAS E. MARTIN, *U. S. Representative from Iowa*  
HON. JOHN W. BYRNES, *U. S. Representative from Wisconsin*  
HON. HALE BOGGS, *U. S. Representative from Louisiana*  
HENRY B. FERNALD, *Loomis, Suffern & Fernald; Chairman, Tax Committee, A.M.C.*  
ELLSWORTH C. ALVORD, *Alvord & Alvord; Tax Counsel, A.M.C.*

##### Report of Resolutions Committee:

Taxation and Government Expenditures

##### Panel on Gold, Silver and Monetary Policy

*Chairman:* DONALD H. McLAUGHLIN, *Pres.*, Homestake Mining Co.; *Chairman, Gold Producers Committee, A.M.C.*  
HON. PAT McCARRAN, *U. S. Senator from Nevada*  
HON. FRANCIS CASE, *U. S. Senator from South Dakota*  
Other speakers to be announced

9:40 A.M. PRE-SESSION MOTION PICTURE—"225,000-Mile Proving Ground"

#### 10:00 A.M. Mining and Metallurgy of Uranium

*Chairman:* MARVIN L. KAY, *Vice-Pres. & Gen. Mgr.*, Climax Uranium Co.

##### Summary of Methods Used in Extracting Uranium

DAN M. KENTRO, *Metallurgical Advisor*, U. S. Atomic Energy Commission

##### Discussion:

WOODROW KNOTT, *Climax Uranium Co.*  
C. E. OSBORN, *Gen. Supt.*, Navajo Uranium Div., Kerr-McGee Oil Industries, Inc.  
WM. B. HALL, *Vitro Uranium Co.*  
D. W. VILES, *Vanadium Corp. of America*

#### Drilling Techniques on the Colorado Plateau

R. G. SULLIVAN, *Vice-Pres. & Gen. Mgr.*, Minerals Engineering Co.

#### Mining and Development of La Salle Orebody

MATTHEW P. ROWE, *Partner*, La Salle Mining Co.

*Discussion:* THOMAS W. NEWELL, *Vice-Pres. & Gen. Mgr.*, Shattuck Denn Mining Co.

9:40 A.M. PRE-SESSION MOTION PICTURE—"Dewatering the Osceola Mine"

#### 10:00 A.M. Underground Mining Methods

*Chairman:* FRANKLIN COOLBAUGH, *Vice-Pres.*, Western Operations, Climax Molybdenum Co.

##### Shaft-Sinking in the Coeur d'Alene

STANLEY W. McDOUGALL, *Mgr. of Mines*, and E. B. OLDS, *Fore.*, Crescent Mine, Bunker Hill & Sullivan Mining & Concentrating Co.

##### Friction-Type (Koeppel) Hoists

GUY N. BJORGE, *Consultant*, Homestake Mining Co.

##### Symposium on Block Caving

M. K. HANNIFAN, *Gen. Supt.*, Kelley Shaft Project, Anaconda Copper Mining Co.  
ROBERT HENDERSON, *Resident Mgr.*, Climax Molybdenum Co.  
J. W. STILL, *Gen. Supt.*, Miami Copper Co.  
J. F. BUCHANAN, *Mine Mgr.*, San Manuel Copper Corp.

#### 12:15 P.M. Strategic Minerals Luncheon

*Chairman:* S. H. WILLISTON, *Vice-Pres.*, Cordero Mining Co.; *Chairman*, Strategic Minerals Committee, A.M.C.

*Address:* HON. J. BRACKEN LEE, *Governor of Utah*

1:40 P.M. PRE-SESSION MOTION PICTURE—"A Close-Up of Steel Production"

#### 2:00 P.M. Uranium Industry and AEC Program on the Colorado Plateau

*Chairman:* T. O. EVANS, *Chief Mining Engr.*, The Atchison, Topeka and Santa Fe Railway Co.

##### Panel Discussion—The AEC Program on the Colorado Plateau

JESSE C. JOHNSON, *Director*, Division of Raw Materials, U. S. Atomic Energy Commission  
SHELDON P. WIMPFEN, *Mgr.*, Grand Junction Operations Office, AEC  
G. R. KENNEDY, *Mgr. of Exploration*, Kerr-McGee Oil Industries, Inc.  
CHARLES A. STEEN, *Pres.*, Utex Exploration Co.  
ROBERT S. PALMER, *Exec. Vice-Pres.*, Colorado Mining Assn.  
T. H. SKIDMORE, *Pres.*, Skidmore Mining Co.; *Pres.*, Uranium Ore Producers Assn.  
L. J. COADY, *Consultant*, Grand Junction, Colo.  
J. W. HILL, *Mining Engineer*, Grand Junction, Colo.

##### The Big Indian Mining District

MERRITT K. RUDDOCK, *Vice-Pres.*, Cal Uranium Co.

# PROGRAM *(Continued)*

## WEDNESDAY, SEPTEMBER 22 (Cont.)

1:40 P.M. PRE-SESSION MOTION PICTURE—"The Science of Making Brass"

### 2:00 P.M. Milling and Metallurgy

Chairman: LOUIS ERCK, *Chief Met.*, Cleveland-Cliffs Iron Co.

Modernization of Kennecott's Magna and Arthur Mills  
P. H. ENSIGN, *Gen. Supt. of Mills*, Kennecott Copper Corp.

Symposium on Crushing, Grinding and Classification

Grinding and Classifying at Humboldt Mill:  
Speaker from Cleveland-Cliffs Iron Co.

Progress Report on Aerofall Mill: R. J. G. FLECK, *Asst. Mgr.*, New York Ore Div., Jones & Laughlin Steel Co.

New Features of Cyclone Design: KELLOGG KREBS, *Pres.*, Equipment Engineers, Inc.

Trend in Heavy Density Flowsheets: R. HAROLD LOWE, *Field Rep.*, American Cyanamid Co.

### 2:00 P.M. Special Sessions

SYMPOSIUM ON DRILL STEEL—"The Connecting Link in Percussion Drilling"

(A round-table discussion of heat-treating and annealing of drill steel, and related problems. This conference is the first of its kind at a Mining Congress Convention. It is hoped that it will be productive of new ideas and that the work begun here may be continued at future meetings. To make this work effective, audience participation is essential.)

Chairman: WILLIAM H. MCCORMICK, *Chief Metallurgist*, Crucible Steel Co. of America

The Problem—What, Why and How  
B. F. SHEPHERD, *Chief Metallurgist*, Ingersoll-Rand Co.

Material—Treatment and Design  
T. E. NORMAN, *Metallurgist*, Climax Molybdenum Co.

Development of Materials  
WILLIAM F. TOWNE, *Met. Supervisor*, Bethlehem Steel Co.

Heat Treatment  
PETER PAYSON, *Asst. Dir. of Research*, Crucible Steel Co. of America

Mechanical Treatment  
FLOYD ANDERSON, *Chief Metallurgist*, Gardner-Denver Co.

Control—The Payoff  
RAYMOND MARCOTTE, *Quality Control Mgr.*, Calumet & Hecla, Inc.

## SAFETY CONFERENCE

Chairman: ALBERT F. KNORP, *Secy.*, California Chapter, American Mining Congress

Selling Safety to Employees  
A. H. ZEILINGER, *Supt. of Safety*, Colorado Fuel & Iron Corp.

Safety Practices in Small Plants  
WARREN S. BROWN, *Safety Engr.*, Pacific Coast Aggregates

The Value of the California Industrial Safety Conference  
J. G. HUSEBY, *Asst. Mgr.*, Mountain Copper Co.

Advances in Safety Practices in Southern California  
RONALD C. GRIFFIN, *Production Mgr.*, Consolidated Rock Products Co.

Safety Organization at Plant Level  
LEONARD R. FLICKER, *Safety Engr.*, Permanente Cement Co.

## TAX CONFERENCE—CEMENT PRODUCERS

Chairman: WALTER A. WECKER, *Pres.*, Marquette Cement Mfg. Co.

### 7:00 P.M. Dinner Dance, Palace Hotel

## THURSDAY, SEPTEMBER 23

9:40 A.M. PRE-SESSION MOTION PICTURE—"The Drama of Portland Cement"

### 10:00 A.M. Outlook for the Mineral Industries

Chairman: FRANK R. MILLIKEN, *Vice-Pres.*, Kennecott Copper Corp.

Nonferrous Metals: SIMON D. STRAUSS, *Vice-Pres.*, American Smelting & Refining Co.

Iron Ore: R. T. ELSTAD, *Pres.*, Oliver Iron Mining Div., U. S. Steel Corp.

Light Metals: LAWRENCE LITCHFIELD, JR., *Gen. Mgr.*, Mining Div., Aluminum Co. of America

Titanium: E. R. ROWLEY, *Pres.*, Titanium Metals Corp. of America

Nonmetallic Minerals: RICHARD J. LUND, *Mgr.*, Information & Analysis Dept., Battelle Memorial Institute

Strategic Minerals: CHARLES H. SEGERSTROM, JR., *Pres.*, Nevada-Massachusetts Co.

Fissionable Materials: JESSE C. JOHNSON, *Director*, Division of Raw Materials, AEC

Canadian Mining Outlook: MARC BOYER, *Deputy Minister of Mines & Technical Surveys*, Canada

Foreign Minerals Outlook: GEORGE O. ARGALL, JR., *Editor*, MINING WORLD

Reports of Resolutions Committee:  
Mine Financing—Social Security



9:40 A.M. PRE-SESSION MOTION PICTURE—"Arizona and Its Natural Resources"

## 10:00 A.M. Operating Problems in Open Pit Mines

**Chairman:** ROBERT W. HUGHES, *Vice-Pres. & Gen. Mgr.*, Miami Copper Co.

**Inspiration:** P. D. I. HONEYMAN, *Vice-Pres. & Gen. Mgr.*, Inspiration Consolidated Copper Co.

**Ray:** J. C. VAN DE WATER, *Supt. of Mines*, Ray Mines Div., Kennecott Copper Corp.

**Silver Bell:** D. R. PURVIS, *Mine Supt.*, Silver Bell Mine, American Smelting & Refining Co.

**Bagdad:** G. W. COLVILLE, *Chief Engr.*, Bagdad Copper Corp.

**Lavender Pit:** C. E. MILLS, *Mgr.*, Phelps Dodge Corp.

**Copper Cities:** B. R. COIL, *Asst. Gen. Mgr.*, Miami Copper Co.

**Yerington:** H. R. BURCH, *Mine Supt.*, Yerington Mine, Anaconda Copper Mining Co.

**Eagle Mountain Iron Mine:** K. B. POWELL, *Supt.*, Raw Materials Operations, Kaiser Steel Co.

## 12:15 P.M. Luncheon Meeting—Board of Governors, Western Division, American Mining Congress

1:40 P.M. PRE-SESSION MOTION PICTURE—"Operation Ivy"—The First H-Bomb Explosion

## 2:00 P.M. New Developments in Uranium—North America

**Chairman:** PHILLIP L. MERRITT, *Asst. Dir.*, Division of Raw Materials, U. S. Atomic Energy Commission

**Recent Developments Outside Colorado Plateau**  
DONALD L. EVERHART, *Geol. Advisor*, Division of Raw Materials, U. S. Atomic Energy Commission

**Weathering of Uranium Deposits**  
ROBERT M. GARRELS, *Geol.*, U. S. Geological Survey

**Southern Basin Ranges of Nevada and California**  
ERNEST E. THURLOW, *Chief*, Salt Lake Exploration Branch, U. S. Atomic Energy Commission

**Tertiary Basin Deposits of Wyoming**  
EUGENE W. GRUTT, JR., *Chief*, Douglas Sub-office, U. S. Atomic Energy Commission

**Black Hills Deposits**  
LINCOLN R. PAGE, U. S. Geological Survey

**Uranium Deposits of the Algoma District, Ontario**  
FRANC JOUBIN, *Managing Dir.*, Technical Mines Consultants

**Ore Deposits of the St. Louis Fault, Athabasca Region, Saskatchewan**  
BRUCE C. McDONALD, *Chief Geol.*, Eldorado Mining & Refining, Ltd.

1:40 P.M. PRE-SESSION MOTION PICTURE—"Ore Dressing and Smelting in Northern Rhodesia"

## 2:00 P.M. Milling and Metallurgy

**Chairman:** NORMAN WEISS, *Milling Engr.*, American Smelting & Refining Co.

**FluoSolids Acid Plant at Yerington**  
A. J. GOULD, *Plant Supt.*, Anaconda Copper Mining Co.

**Modern Mill Design and Construction**  
M. W. BOWEN, *Exec. Vice-Pres.*, Golden Cycle Corp.

W. R. EASLEY, *Mgr.*, Western Div., Western-Knapp Engineering Co.

H. V. HUGHES, *Mgr.*, Industrial Div., Southwestern Engineering Co.

H. L. MCNEILL, *Stearns-Roger Mfg. Co.*

O. W. WALVOORD, *Owner*, O. W. Walvoord Co.

1:40 P.M. PRE-SESSION MOTION PICTURE—"Iron Ore from Cerro Bolivar"

## 2:00 P.M. Improved Equipment in Open-Pit Mining

**Chairman:** R. W. WHITNEY, *Gen. Mgr. of Minnesota Mines*, The M. A. Hanna Co.

**Scientific Mining Increases Profits**  
(A mathematical approach to the design and operation of heavy mining equipment)  
THOMAS M. WARE, *Vice-Pres. of Engrg.*, International Minerals & Chemical Corp.

**Experience with Large Rotary Drills**  
LEWIS A. PARSONS, *Consulting Engr.*, Calaveras Cement Co.

**Discussion—Churn Drills and Mobile Drills:** L. E. SNOW, *Gen. Fore.*, *Drilling & Blasting*, Kennecott Copper Corp.

★ ★ ★

## EVENING—San Francisco Civic Opera—Lucia di Lammermoor

FRIDAY, SEPTEMBER 24

## 10:00 A.M. Tax Forum to 4:30 P.M.

**Chairman:** HENRY B. FERNALD, *Chairman*, Tax Committee, American Mining Congress

A full discussion will be held of the new 1954 Revenue Act, which contains many provisions of direct interest to the mining industry.

## 10:00 A.M. Minerals Beneficiation to 4:30 P.M.

This regular fall meeting of the "MBD" will include morning and afternoon sessions and a special luncheon meeting in the Fairmont Hotel.



HOWARD L. YOUNG  
President

*Directors*  
**AMERICAN MINING  
CONGRESS**



HORACE M. ALBRIGHT



JOEL M. BOWLBY



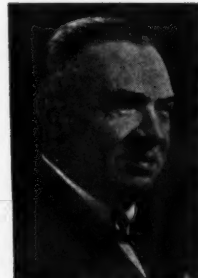
WORTHEN BRADLEY



LOUIS S. CATES



JOHN P. COURTRIGHT



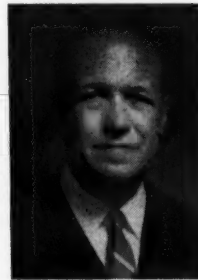
CHARLES R. COX



ROBERT E. DWYER



RUDOLPH T. ELSTAD



ANDREW FLETCHER



CARROLL A. GARNER



RALPH K. GOTTSALL



GEO. B. HARRINGTON



R. A. HUMMEL



H. C. JACKSON

For convenience in transmitting these to the chairmen and members of the proper subcommittees, suggestions should be sent in writing to the American Mining Congress, Ring Bldg., Washington 6, D. C.

On Saturday, September 18, the full committee will meet in San Francisco. At that time a reasonable amount of time will be devoted to hearing from those who wish to ap-

pear in person to supplement their written recommendations. Anyone who wishes to take this opportunity should submit, in writing, the gist of his remarks to the Washington office of the Mining Congress.

At appropriate points during the Convention sessions, the reports of the Resolutions Committee will be submitted to the Convention. This procedure permits those taking

part to give fullest consideration to these important industry policies.

### Show Bigger Than Ever

Every mining man, no matter what his field, will find in the 1954 Mining Show the newest machinery and supplies to help him do a better, safer job. Almost 150 exhibitors, occupying more than 65,000 net sq ft of exhibit space, have bent every effort to make this the biggest, most complete exposition of equipment and supplies for the metal and nonmetallic mining industry ever held.

Among other items the displays will include: the newest prospecting and surveying instruments; drills for prospecting, drills for blastholes; drilling and blasting supplies; scrapers and mechanical loaders for use underground; power shovels, draglines and other loading equipment for open pit mines; mine

minerals industry on earth. Thumb-nail descriptions of the exhibits are presented in a special section of this issue beginning on page 63. These brief write-ups can convey only a hint of what is in store for Convention visitors. The Exposition must be seen to be appreciated.

Manufacturers' representatives will be on hand to answer questions and confer with operating men. Many of them are technical men and former operators, and appreciate the problems faced in the day to day working of a mining property. They will be happy to take as much time as necessary to discuss the applications of the new products on display or to make suggestions for the most efficient use of existing equipment under particular conditions.

The combination of Convention sessions and Exposition make the 1954 Mining Show an



L. RUSSELL KELCE



GEORGE H. LOVE

### Directors

(Continued)

(Not Shown)

NEIL W. RICE



D. S. MacBRIDE



J. W. OVERSTREET



CHAS. J. POTTER



L. J. RANDALL



MERRILL E. SHOUP



RAYMOND E. SALVATI



HARRIE S. TAYLOR

cars, conveyors, trucks and self loading vehicles for surface and underground haulage use; locomotives, tractors and engines; screens; crushers; rod mills, ball mills and tube mills; gravity separation machinery and flotation equipment; classifiers; and all the thousand and one items of auxiliary equipment, safety devices and operating supplies that help make domestic mining the most efficient and safest

unparalleled educational opportunity. Recognizing this, and also the value to their younger men of meeting the leaders of the industry, many mining companies make a practice of sending their key technical and production men as well as executives to these meetings. They have found that the broader knowledge and renewed enthusiasm brought back from the Mining Show more than pays off in new



ideas and greater efficiency throughout the year.

### Entertainment

San Francisco is a mecca for those who know and appreciate its fine food and sterling entertainment as well as its beautiful and historic scenic attractions. Mining Congress Conventions, too, are famous for fine food, congenial company and outstanding entertainment. Put the Convention in San Francisco and the combination is unbeatable. To allow convention visitors to enjoy both to the utmost, a special entertainment program has been arranged.

Monday and Wednesday evenings will be devoted to AMC functions; Tuesday and Thursday have been left open so the mining men and their ladies can attend any of the numerous private parties being arranged, or visit with friends, old and new.

On Monday, September 20, the social season gets under way with the perennial Miners Jamboree. The spirit of the Old West will reign at this Jamboree, which will be held in the Palace of Fine Arts. This huge building, all that remains of the 1915 World's Fair, is the only place big enough to accommodate the crowd expected to turn out for the chuck-wagon dinner, entertainment and dance. Two bands will provide continuous music, and the entertainment program will be in keeping with the spirit of the evening. All in all the Miners Jamboree of 1954 will be a social event that will be remembered and talked about for a long time to come.

The social climax of a Convention is usually a big banquet—in the case of AMC Conventions, a "speechless" banquet. But here again the number who will attend has ruled out a banquet for Wednesday evening. Instead the big event this year will be the AMC Dinner-Dance. This will be held in the Garden Court and adjoining ballroom of the historic Palace Hotel. No speeches, no introduction of head table guests—in fact no head table—just a superb dinner, top notch dance music and a scintillating floor show will add up to the fun and good fellowship for which these parties are justly famous. Informality will be the keynote of the evening. Requests for table reservations should be sent in early, especially for those who want to sit together as a group.

The Mining Show takes place when the season of the famous San Francisco Opera Asso-

### MBD TO MEET

The Minerals Beneficiation Division of the American Institute of Mining and Metallurgical Engineers has scheduled its regular Fall Meeting for Friday, September 24, at the Fairmont Hotel in San Francisco. A full program—technical sessions in the morning and afternoon and a luncheon meeting at noon—has been arranged.

There will be a registration desk for this event at the Civic Auditorium during the week and at the Fairmont on Friday. All those interested in milling and metallurgy will find that close cooperation between the American Mining Congress and the Minerals Beneficiation Division of the AIME has resulted in an integrated presentation of what is new and valuable in this important field. Attendance at both the Mining Show and the MBD Fall Meeting will pay big dividends. No mill man or metallurgist can afford to miss the opportunity.

ciation is at its height. For the benefit of the mining visitors, the Association has set aside a block of tickets for the performance of Lucia di Lammermoor on Thursday evening, September 23. Mado Robin, the French coloratura making her American debut, is featured as the hapless Lucia in this famous opera adapted from the novel by Sir Walter Scott. The cast includes Frank Guarrera and Nicola Moscona. Jan Peerce sings the tenor role.

### Special For the Ladies

In addition to an open invitation to see the Exposition and attend all Convention functions, the ladies are particularly invited to take part in the fine program arranged just for them.

On Monday, September 20, a circle tour en route to and from a tea and reception at the California Palace of the Legion of Honor has been planned. The tour will take the ladies to Twin Peaks, Golden Gate Park, Cliff House, Golden Gate Bridge, the Presidio, the Marina and other famous points of interest. On Tuesday there is to be a luncheon get-together at the Hotel Claremont, high in the Berkeley Hills.

Coffee and rolls at the St. Francis Hotel on

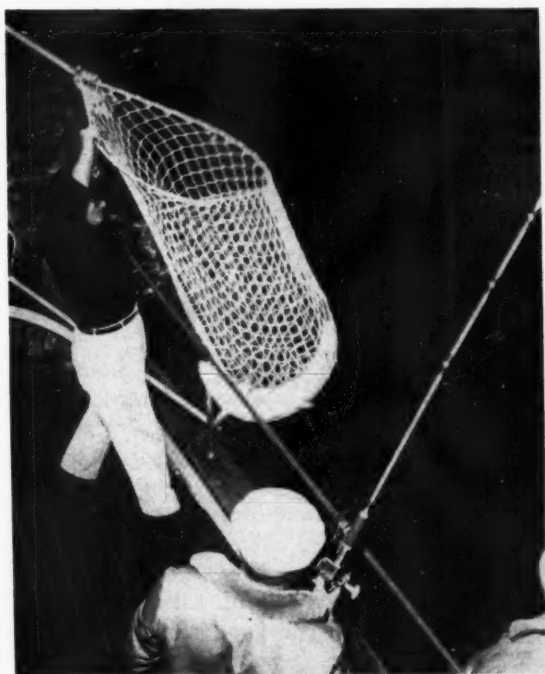
Wednesday morning will be the prelude to a specially conducted tour of some of San Francisco's most interesting and intriguing shops.

At the Mark Hopkins on Thursday a special luncheon and style show has been arranged. This will feature the latest fashions in apparel and accessories from Sak's Fifth Avenue of San Francisco.

### Special Events

The sporting event of the mining year, the great AMC Salmon Derby, is scheduled for Friday, September 24. Boats will leave Sausalito at 6:30 A.M. By special arrangement with the King of the Salmon, waters outside the Golden Gate will teem with fish just waiting for Convention visitors to drop a hook to them. To make this easy, special preparations have been made to outfit the AMC fishing fleet. Each of the clean, comfortable cabin power boats is capable of carrying six to ten persons comfortably.

Skippers of all craft in the fleet will be happy to instruct the uninitiated and to lend a hand with the fishing tackle and bait which will be provided. At 2:30 P.M. the fleet will return to the dock where prizes will be awarded for the largest salmon caught. There will also be facilities for freezing the catch for shipment home.



It takes a strong net to boat a Pacific salmon



Fifty years ago the first dredges went into operation on the Yuba

So far as possible, groups requesting it will be assigned to the same boat. Such requests should be sent in early to help the committee complete this task to everyone's satisfaction. Oh yes, wear warm clothes and be prepared for choppy weather.

### See the Dredges

It was 50 years ago that the first dredges were put into use on the Yuba River. Great improvements in the design and operation of these self-contained giants have been made. For those interested, an all-day jaunt has been arranged to permit Convention visitors to see some of the huge craft in action.

On the return trip from the Yuba River, travelers will stop for lunch at the Bret Harte Inn in Grass Valley, and then continue to San Francisco via the Mother Lode country and Sacramento. All the romance of 100 years of gold mining in California is wrapped up in this trip. Buses will leave the Fairmont, St. Francis and Palace Hotels at 7:30-8:00 A.M. and return about 7 P.M.

Other trips on Friday include visits to the Wire Rope Mill of the Columbia-Geneva Division, U. S. Steel Corp., at Pittsburg, Calif.; to the American Smelting & Refining Co. Smelter and Zinc Fuming Plant at Selby, or the Shell Research Center at Emeryville. Those wishing to take any of these tours should indicate their preference on their order blanks and check in at the Trips Desk at the Civic Auditorium as soon as possible after arriving in San Francisco.

### Order Tickets Early

An early order for tickets for all social functions and for the special events on Friday, September 24, will be appreciated. To com-



**JULIAN D. CONOVER**  
*Executive Vice-President and Secretary*

*Staff Members*  
**AMERICAN MINING CONGRESS**



**HARRY L. MOFFETT**



**JOHN R. ARANT**



**HENRY I. DWORSHAK**

*Public Relations*



**P. D. McMURRER**  
*Assistant Secretary*



**WILLIAM I. POWELL**  
*Taxation*



**G. B. SOUTHWARD**  
*Mechanization Engineer*



**JOHN C. FOX**  
*Editor*  
*Mining Congress Journal*



**GEORGE W. SALL**  
*Assistant Editor*

plete arrangements, the committees must know how many to provide for. Help them and avoid disappointment.

The Housing Bureau also urges that requests for reservations, not yet sent in, be forwarded immediately to AMC Housing Bureau, Room 300, 61 Grove St., San Francisco 2, Calif. Applications should specify time of arrival and departure, and must be accompanied by a deposit of \$10 for each room requested.

The American Mining Congress Metal and Nonmetallic Mining Convention and Exposition in San Francisco's Civic Auditorium is the big event of 1954. In this year, when every mining man is looking for ways to cut costs and produce more efficiently and safely attendance will be a "must." In addition to

the opportunity to learn in the Convention sessions how Government and Industry are facing and solving vital problems on the economic and legislative fronts, the operating sessions and the Exposition will provide a veritable gold mine of new ideas and inspiration.

On the lighter side, Mr. and Mrs. Mining Man can look forward to more fun and friendship than ever. Be on hand with your friends to share all the good things in store. Take up the slogan, San Francisco, Here We Come!



# The Exposition



RALPH K. GOTTSHALL  
Chairman  
Manufacturers Division



ONE hundred forty-seven manufacturers and suppliers of mining equipment will use 65,000 square feet of exhibit space to display their wares in San Francisco's Civic Auditorium. Read the following exhibit descriptions closely and check those you particularly want to see. This preview is your key to maximum dividends from the greatest Mining Show on earth.

• AERO SERVICE CORP.

Display will feature advantages of aerial mapping and aerial prospecting. Exhibit material will include aerial photos, photo maps, topographic maps and a new type relief map. Data on the air-borne magnetometer will also be presented. *In charge—Charles M. Hodell.*

• ALLEN-SHERMAN-HOFF PUMP CO., THE

Will exhibit their new Centriseal Pump used for the pumping of abrasive and/or corrosive fluid-solid mixtures. *In charge—William B. Stephenson.*

• ALLIS-CHALMERS MFG. CO.  
GENERAL MACHINERY DIVISION

Plan to show operating models of the Hydrocone and A-1 jaw crushers of the Calaveras Cement Co. In addition, a grinding mill display, a rod deck screen, and a rubber-lined pump will be exhibited.

• ALLIS-CHALMERS MFG. CO.  
TRACTOR DIVISION

Exhibit will include a TS-300 motor scraper; an AD-40 motor grader with scarifier; a Model D motor grader, and four crawler tractors—the HD-20 G Torque Converter with ripper, HD-5G with Carco Winch, HD-15C Torque Converter with Gar Wood CT-153 dozer; and the HD-9 with Baker dozer and Carco winch.

• ALLOY STEEL AND METALS CO.

Exhibit will be built around operating pictures of Pacific Slushmaster scrapers and the Improved Pacific Round the Corner Sheave Block. Also displayed will be a Model 2A 34-in. Pacific Slushmaster Scraper, the Improved Pacific Round the Corner Sheave Block, all sizes of Pacific Sheave Blocks and a new heavy-duty manganese steel front idler for crawler type tractors. *In charge—John M. McKean.*

• **AMERICAN AIR FILTER CO., INC., THE**

Will exhibit dust collection and air filtration equipment. Included will be the Cycoil Oil Bath Air Filter for engine and compressor application and the Amerclone, a new dry type centrifugal dust collector that is being exhibited for the first time. *In charge—John Kane.*

• **AMERICAN BRATTICE CLOTH CORP.**

Will display their Mine Vent flexible ventilation tubing. Different grades of rubberized fabric tubing will be featured, as well as the ABC Demountable Coupling. *In charge—D. Blaine Mikesell.*

• **AMERICAN MANGANESE STEEL DIVISION  
AMERICAN BRAKE SHOE CO.**

Plan to feature their new welding machines which use the principle of magnetic flux welding. There will be a live demonstration of the new Amsco Leader Welding machines for building up tractor rollers and idlers. In addition, the Amsco Double wave design liner for ball and rod mills will be exhibited.

• **AMERICAN MINE DOOR CO.**

Will feature their Model 40 Track Cleaning Machine. Also on display will be their Electric Track Switch Thrower as used for Selective or Derail Type Switches. *In charge—Glenn D. Gurney.*

• **AMERICAN WHEELABRATOR & EQUIPMENT CORP.**

Highlighted will be a display of a cut-away model of an actual full-sized Dustube dust collector. Photographs of dust collection systems in various mining and metallurgical installations, together with a flow sheet in lights portraying the collection of fume from a lead blast furnace, will also be shown. *In charge—L. L. Andrus and R. T. Pring.*

• **ANACONDA WIRE & CABLE CO.**

Exhibit, in diorama style, will depict various mining operations and illustrate the proper type of wire and cable used in the separate routines. In addition, a photographic blow-up will show the step-by-step build up of shuttle car cables. *In charge—C. B. Peck.*

• **ATLAS POWDER CO.**

Will exhibit machine gun sequence and motion pictures of open pit blasting in Utah. For underground mining they will show the latest methods of using the Rockmaster blasting system in stopes, headings, raises and shafts. Also on display will be the new Atlas condenser-discharge-type blasting machine. *In charge—Joe Dannenberg.*

• **AUSTIN-WESTERN CO.**

Plans to show its new indoor-outdoor self-propelled Hydraulic crane which features turntable rotation, boom elevation, raising and lowering of cable and hook, and power extension and retraction of the boom. *In charge—J. E. Huber.*

• **BALDWIN-LIMA-HAMILTON CORP.  
CONSTRUCTION EQUIPMENT DIVISION**

Will feature a photographic exhibit of their products for the mining industry. *In charge—T. A. Griffin.*

• **BAND-IT CO.**

No description available.

• **BARBER-GREENE CO.**

The exhibit will include an animated conveyor idler display featuring six full-sized carriers and return rolls. Moving belts will run around the idlers to highlight oper-

ational features while a self-aligning carrier is actuated to illustrate its function. *In charge—Harold W. Newton.*

• **BEMIS BRO. BAG CO.**

Will exhibit Flexipipe ventilation tubing, and various types of waterproof bags and Multiwall bags used in mining. Samples of the different grades of Flexipipe material, types of suspension, and couplings will be shown. *In charge—Ivan D. Teter.*

• **BETHLEHEM PACIFIC COAST STEEL CORP.**

Featured will be a yielding arch section, a new type of mine roof support which is being introduced for the first time to western mine operators. Other products shown will include shaft, slope, and slusher wire rope; carbon and alloy drill steel; and expansion head and slotted type mine roof bolts. *In charge—George M. Huck, Colby Howe, and Frank T. Saunders.*

• **BICO, INC.**

Will feature the Chipmunk crusher, a UA pulverizer, a vertical grinder-pulverizer, flat belt drive, vee belt and a direct driven pulverizer. Also on display will be sieve shakers, assay furnace, burners, cupels and other products engineered for the assay laboratory. *In charge—Joseph De Palma.*

• **BIXBY-ZIMMER ENGINEERING CO.**

Display will include a scale model operating vibrator with Bixby-Zimmer welded stainless steel screens installed showing general screen application. New type Grizzly Rod Screen will be featured. *In charge—Ray Kaga.*

• **BOYLES BROS. DRILLING CO., LTD.**

Will demonstrate surface and underground diamond drills ranging from 200 up to 2400-ft depth capacity. Air powered underground drills incorporate vane and piston type motors, coring and blasthole gear feed swivelheads. A model JVR blasthole drill featuring reversible motor and right hand threaded feedscrew for adding of rods by drill power will also be shown. *In charge—D. R. Montgomery.*

• **BRODERICK & BASCOM ROPE CO.**

Display will be built around a reel of wire rope. This will be supplemented by a number of transmits of typical wire rope uses in the Mining Industry. *In charge—Fred Zimmerman.*

• **BRUNNER & LAY ROCK BIT CORP.**

In addition to the line of tungsten carbide Rok-Bits, the company will display drill steel, carbide inserted drill steel, long hole drilling tools and bits for plug drilling. *In charge—John Neamand.*

• **BUCYRUS-ERIE CO.**

Will display a working model of their six-cu yd 150-B electric shovel. The model is scaled down to 1/12 of original size and will be operated using an actual operator's station from a full size machine. *In charge—R. M. Dickey.*

• **BUDA CO.  
DIVISION OF ALLIS-CHALMERS MANUFACTURING CO.**

Plans to exhibit a new model Turbocharged diesel engine especially designed for powering haulage and mining trucks. A new model Shovel Power Unit with Torque Converter, especially designed for powering shovels, draglines, and cranes, will also be shown along with a small diesel electric generator set. *In charge—Charles Riding or H. H. Cohenour.*

• **BULLARD CO., E. D.**

Will display their complete line of glass, glass fiber and aluminum safety hats and caps, first aid kits and supplies, safety belts, face shields, protective clothing, eye and respiratory protection, and other industrial safety equipment. *In charge—E. W. Bullard, Jr.*

• **C & D BATTERIES, INC.**

Will exhibit two basic types of equipment. A Five-Fold Slyver Clad cycling type battery for locomotives, shuttle cars and trammers will be shown. In addition, the company is introducing at this exhibit their new line of lead calcium stationary batteries for control, switch-gear and auxiliary power. *In charge—Howard Toncray.*

• **CAPITOL FOUNDRY CO.**

See National Malleable and Steel Castings Co.

• **CARD IRON WORKS CO., C. S.**

Exhibit will consist of operating models of equipment furnished the mining industry by the company. It will include several types of cars, skips, and dumpers.

• **CATERPILLAR TRACTOR CO.**

Will feature a complete line of mining equipment. Included will be a Cat DW20 or DW21 with an Athey Wagon, D397 Engine, No. 6 Shovel, DW15 and 15 Scraper, D8 and U Dozer, No. 12 Motor Grader, Winter-Wiess Drill on a D7 or D8, C & D Sierra Loader and Movall, D4 with Dozer or HT4 Shovel with Oxycatalyst, and Preco Rippers. *In charge—W. H. Hogan.*

• **CHICAGO PNEUMATIC TOOL CO.**

Exhibit will feature the company's complete line of drilling and mine maintenance equipment. It will include the CP-555 Rotauger designed for softer rock formations; a working set-up of the CP and Airleg; the CP-34 Stoper and the CP-50N Drifter; the CP-55 Diamond Drill for coring and blast holing; skid mounted core drill; a line of sinker drills for secondary breaking; and demolition tools for trimming and brushing. Mine maintenance equipment will consist of sludge and sump pumps, utility winches, air impact wrenches, riveting and rivet busting hammers, chippers, pneumatic grinders and heavy-duty drills. *In charge—Maurice F. Fitzgerald.*

• **CHIKSAN CO.**

Will feature the new Intelli-Giant hydraulic mining gun available with manual hydraulic controls or with remote controls. In addition, a small, operating model of the Giant will be displayed. Chiksan ball bearing swivel joints, unions, and petroleum drilling equipment will also be shown. *In charge—E. Nemes Thomas.*

• **CHRISTENSEN DIAMOND PRODUCTS CO.**

Will show a variety of standard core bits encompassing variations in waterways, diamond size and grade, and matrix hardness. Concave bits of all designs; reaming shells of both the balanced type and insert type; and examples of hard faced reaming shells will also be shown. Steps in the manufacture of a diamond bit will be covered fully by color slides.

• **COAST MANUFACTURING & SUPPLY CO.**

Exhibit will consist essentially of model illustrating principles of Spittercord use in conjunction with safety fuse. *In charge—F. W. Nelson.*

• **COLORADO FUEL AND IRON CORP., THE**

Will feature a hospitality center. Telephone service

## SPONSORS

(Not exhibiting, but actively supporting the Mining Show)

**AMERICAN CYANAMID CO.**

Mineral Dressing Department

DEISTER CONCENTRATOR CO., THE

DORR COMPANY, ENGINEERS

DOW CHEMICAL CO., THE

FIRESTONE TIRE & RUBBER CO., THE

GOODYEAR TIRE & RUBBER CO., INC.

IRWIN FOUNDRY & MINE CAR CO.

KENNAMETAL INC.

MACK TRUCK CORP.

MINE & SMELTER SUPPLY CO.

Marcy Mill Division

MURPHY DIESEL CO.

NATIONAL ELECTRIC COIL CO.

PETERSON FILTERS AND ENGINEERING CO., INC.

PIONEER RUBBER MILLS

SHEFFIELD STEEL CORP.

STEARNS-ROGER MFG. CO., THE

TROJAN POWDER CO.

WESTERN PRECIPITATION CORP.

will be available as will a complete secretarial service, adequately staffed to write letters, send telegrams, place and receive long distance calls and make hotel and transportation reservations. An information center will be maintained to answer questions in regard to the mining show. *In charge—Harmon H. Davis.*

• **COLUMBIA-GENEVA STEEL DIVISION  
UNITED STATES STEEL CORP.**

See U. S. Steel Corp.

• **CONVEYOR CO., THE**

Exhibit will consist of working models of Conveyco Automatic Weighing Feeders, Conveyco Conveyor Scales, automatic weight printing equipment and similar items manufactured by the company.

• **COPCO PACIFIC, LTD.**

Will join its associate Eastern, Canadian and Mexican companies to display a complete range of their Atlas rock drills and Coromant drill steels, as well as the company's new AR Series compressor. Featured will be an unusual collection of mineral-bearing ores selected from mines throughout the country. A new line of Coromant detachable rock bits will make its debut. *In charge—Paul Snow.*

• **CRUCIBLE STEEL CO. OF AMERICA**

Will feature a cutaway showing sections of Crucible Hollow Drill Rod as it goes through its manufacturing process. Other items on exhibit will be Trentweld stainless steel tubing, Rezistal stainless steel, Rexweld hard surfacing rods, Max-el machinery steels, and drill bits made of Hy-Tuf nickel alloy steel. *In charge—R. W. Persons.*

• **CUMMINS ENGINE CO., INC.**

Will feature their new PT diesel fuel system for the heavy-duty engines used in mining equipment. Units will be available for visitors to assemble and disassemble. In addition, two activated cutaway Cummins diesel engines

will show the functioning of the fuel system components as they are related to the engine. *In charge*—J. W. Rowell.

• **DART TRUCK CO.**

Will put on display for the first time its new Model 35SA—a 35-ton end dump truck with a side mounted 388-hp Butane Engine. In addition, the Model 20-S, 20-ton and Model 10-S, 10-ton, trucks will be shown. *In charge*—M. T. Kasper.

• **DAVEY COMPRESSOR CO.**

Featured will be the Davey M-8A Rotary Drilling Machine mounted on a tandem axle GMC chassis and separately powered by a GMC diesel power unit. A special air core barrel will be demonstrated. *In charge*—J. T. Myers.

• **DENVER EQUIPMENT CO.**

One of the key exhibits will be a full size No. 24 Denver Sub A Rougher Flotation Machine. In addition, a 16-in. Denver-Finney classifier and a Denver Automatic Sampler will be exhibited. *In charge*—H. J. Gisler.

• **DETROIT DIESEL ENGINE DIVISION  
GENERAL MOTORS CORP.**

Three diesel engines will be featured. Included are six-cylinder fan-to-flywheel models in the "71" and "110" Series and the Division's new 4-51 valveless power package. Three motorized cutaway models showing the two-cycle operation and the design features of engines in each series are also included. *In charge*—J. C. Campbell.

• **DINGS MAGNETIC SEPARATOR CO.**

Focal point of the exhibit will be the company's drum and belt type wet magnetic separators. Particular emphasis will be placed on the application of Alnico alloy permanent magnetic separators in the mining industry. *In charge*—J. L. Gille.

• **DODGE MANUFACTURING CORP.**

Featured will be the interchangeability of the Taper-Lock bushing in Taper-Lock sprockets for roller chain, V-belt sheaves, flexible and rigid couplings, and solid steel conveyor pulleys. In addition, a 36-in. by 51-in. Taper-Lock solid steel conveyor pulley will be shown in sectioned form to show internal features of the drum-type construction. *In charge*—L. O. Carroll.

• **DUNKIN BLUE PRINT & SUPPLY CO.**

A complete line of uranium maps with the late books, publications and charts of interest to mining men will be featured along with some K & E mining and engineering equipment. *In charge*—J. E. Dunkin.

• **DU PONT DE NEMOURS & CO., INC., E. I.**

The booth will feature Du Pont's Blasting Team for safety in open pit mining. Included will be Nitramon and Nitramex blasting agents, Pelletol, and MS Connectors. For underground mining, Thermalite Ignitacord, Gelex and MS delay electric blasting caps for long hole mining will be shown along with the company's condenser discharge blasting machines. *In charge*—S. M. Stroecker, Jr.

• **EIMCO CORP., THE**

Will display several new pieces of equipment for the mining and metallurgical industries. *In charge*—J. K. Russell.

• **ELECTRIC STEEL FOUNDRY CO.**

Booth will feature Esco two-piece renewable teeth for the mining industry. Additional products to be displayed

are stainless steel piping, valves and fittings for handling of corrosive fluids and heat resistant castings for ore processing systems. *In charge*—Norval Grubb.

• **ELECTRIC STORAGE BATTERY CO., THE  
EXIDE INDUSTRIAL DIVISION**

Exhibit will feature the improved Exide-Ironclad battery for mine locomotive service, with Silvium and polyethylene. In addition, cutaway cells and batteries used in the metal mining fields will be displayed. *In charge*—T. H. Dooling.

• **ENGINEERING & MINING JOURNAL**

Featured will be information on the world-wide metal and nonmetallic mining, milling, smelting, and refining industries. *In charge*—Carl Coash.

• **ENGINEERS SYNDICATE, LTD.**

Exhibit will consist of Uranium Exploration Equipment. Included will be portable scintillation counters, geiger counters, airborne scintillation counters, and drill hole logging instruments. *In charge*—Walt Bilicke and Randolph Hubka.

• **EQUIPMENT ENGINEERS INC.**

Will exhibit various models of the Krebs single and two stage cyclones with examples of precision machined cases and molded replaceable pure gum rubber linings. The new Model E Clarkson Feeders in PVC as well as in stainless steel will also be on display. *In charge*—Dick Krebs and Bob Clarkson.

• **EUCLID DIVISION, GENERAL MOTORS CORP.**

Plan to feature a new S-7 overhung seven-cu yd hydraulic scraper, a 15.5-cu yd "torqmatic" drive scraper and a 22-ton "torqmatic" drive rear-dump truck. *In charge*—V. L. Snow, J. E. Ehler, A. S. McClimon and R. E. Keidel.

• **FAILING CO., GEO. E.**

Plan to show the Failing Model CBH Holemaster, a self-contained mobile drill which combines hydraulic chain feed with the use of compressed air for cuttings removal. *In charge*—H. J. Godschalk.

• **FEMCO, INC.**

Booth will feature detection, indication, control and communication equipment. Industrial Physics Tramp Iron Detector, Vincent Proximity Alarm and Femco's line of carrier equipment, Audiophone, and automation devices will also be shown. *In charge*—Warren C. Sprague and Carl M. Marquardt.

• **FISHER RESEARCH LABORATORY, INC.**

Plan to exhibit a variety of geophysical equipment with applications in the mining industry. Included will be a complete line of new field Geiger counters and electromagnetic type exploration equipment. *In charge*—George MacLeod.

• **FISKE BROTHERS REFINING CO.  
LUBRIPLATE DIVISION**

Exhibit will consist of moving equipment showing the suitability of Lubriplate lubricants in the mining industry. *In charge*—H. E. Van Bevers.

• **FLEXIBLE STEEL LACING CO.**

Exhibit will be built around a 20-ft incline conveyor. The use of all the company's belt fasteners will be demonstrated on the conveyor belt. The new Flexco Speed Tools will be on display and demonstrated. *In charge*—John Ramsey and Newton R. Crum.



• **FLEXIBLE TUBING CORP.**

A complete line of flexible fabric ducting for mine and tunnel ventilation including spiratube A, a flexible, lightweight, wire-reinforced ducting and Ayratube, a heavy duty pressure tube without wire reinforcement, will be exhibited.

• **GALIGHER CO., THE**

Will display Vacseal pumps, Galigher acid-proof sump pumps, Agitair flotation machines, laboratory Agitair flotation machines, Geary-Jennings samplers, Davis Patented Agitators, ore dressing equipment, a control panel and model sample mill, and rubber fittings. All units are regular size and most will be in operation. *In charge—S. L. Evans.*

• **GARDNER-DENVER CO.**

Exhibit will feature a new mechanized drilling unit and deep hole percussion drilling equipment as well as other new models and types of the company's standard equipment. *In charge—J. A. Caverly.*

• **GATES RUBBER CO., THE**

Will feature the simplicity of fabricating material handling equipment from Gates Rubber Faced Steel Plate. Visitors may personally try their hand at welding, bolting and riveting the material. *In charge—Irwin Cone.*

• **GENERAL CABLE CORP.**

Will feature new Super Service heavy duty portable cords and cables for the mining industry. In addition to these, the display will also feature the M. I. Wiring System, building wires and cables and trolley wires. *In charge—R. O. Barnes.*

• **GENERAL ELECTRIC CO.**

Exhibit will feature a new model underground 1½-ton trammer and a comprehensive motor display. The motors include those with special features for driving flotation cell impellers, slusher hoists, conveyers and shovel equipment for unusual conditions in taconite beneficiation plants. Exhibit will also include a display of two-way radio, mine lighting, wire and cable and many other items of specific interest to the industry. *In charge—Richard D. Ketner.*

• **GOODMAN MANUFACTURING CO.  
STORAGE BATTERY LOCOMOTIVE DIVISION**

Exhibit will include the 1½-ton Mancha Little Trammer, a six-ton Mancha Trackmaster diesel locomotive, and a nine-ton Mancha Hercules BX storage battery locomotive. For the Mancha Little Trammer a new cam operated controller with improved lever brake and deadman foot switch will be shown for the first time. *In charge—John D. James.*

• **GOULD-NATIONAL BATTERIES, INC.**

Exhibit will consist of a display of battery cells and battery data pertaining to the mining industry. Batteries on display will feature the new Diamond "Z" Grid. Company representatives will be on hand to answer specific questions on any battery mining operations. *In charge—J. S. McCullough.*

• **GRIPHOIST, INC.**

No description available.

• **GUSTIN-BACON MANUFACTURING CO.**

Will exhibit their complete line of pipe couplings and fittings for grooved-end pipe. Featured will be a new lightweight grooved end pipe coupling, Gruvajoint. *In charge—W. F. Teague.*

• **HARDINGE CO., INC.**

Will exhibit working models of the Hardinge Tricone Mill in glass showing the action of the balls, the Hardinge Auto-Raise Thickener, and the Hardinge Automatic Backwash Sand Filter in plexiglas, with complete circulatory system. Also included will be an illuminated background panel of photographs and flow sheets.

• **HARNISCHFEGER CORP.**

Will introduce for the first time full "Electronic Stepless Control" for P&H Electric Shovels. Actual standard working controls will be set up for visitors to operate. A P&H Model Magnetorque, along with a Magnetorque Cutaway, will also be demonstrated. P&H Welders and Hoists will round out the exhibit. *In charge—Ralph Holcomb.*

• **HAZARD INSULATED WIRE WORKS DIVISION  
OKONITE CO., THE**

Will display Hazacord portable cables for all types of electrical mining equipment. Special attention will be paid to the cable constructions required by various equipment used in underground and surface mining operations. *In charge—Thomas R. Weichel.*

• **HERCULES MOTORS CORP.**

Will exhibit five models of engines and power units. There will be a four-cylinder diesel engine and a six-cylinder diesel engine in addition to three power units, a two-cylinder diesel, a four-cylinder gasoline and a six-cylinder diesel. *In charge—William Brumback.*

• **HERCULES POWDER CO.**

The theme of the exhibit will be "Where Explosives Knowledge Pays Off". The new Hercules Titan Blaster, a condenser discharge-type blasting machine, will be displayed for the first time. Other displays will illustrate the uses of Hercules explosives and blasting supplies in the mining industry. Among these will be Hercomite and Gelamite Dynamite, the 23G Timesaver package, V.A.O. Blasting Meter, regular No Vent Delay, Short-Period Delay, and regular Electric Blasting Caps. *In charge—George B. Bossert.*

• **HEWITT-ROBINS INCORPORATED**

Featured will be the new Robintronic Level Indicator which shuts off feeders when chutes clog or bins fill. Also on display will be Eliptex and Vibrex vibrating screens, a Heavy Duty Car Shakeout, an electrically heated vibrating Gyrex screen, and a 45-ft mine conveyor in action. *In charge—R. U. Jackson.*

• **HOMELITE CORP.**

Featured will be the new Bosch High-Cycle Electric Rock Drill. Also shown will be a high-cycle generator (for powering the drill), an a-c generator, a pressure pump for fire protection, self-priming centrifugal pumps, and Homelite chain saws. *In charge—Robert Glidden.*

• **HOUSTON TECHNICAL LABORATORIES**

Will feature two complementary mining exploration tools—the High Resolution Reflection Seismograph System and the Worden Standard Gravity Meter. The former is a new development to enable the utilization of the Reflection Seismograph Technique to map shallow reflection horizons from 100 to 2500-ft depths. *In charge—Norman Harding.*

• **HUMPHREYS INVESTMENT CO., THE  
ENGINEERING DIVISION**

An operating Humphreys spiral concentrator will be featured showing the separation of titanium and other

heavy minerals from sand in which they occur. *In charge*—Merrill Welker.

• **INGERSOLL-RAND CO.**

Several new developments for the mining industry will be on display, along with the company's line of Rock Drill equipment, including Carset Jackbits. Various types of other air operated tools and hoists will also be exhibited. Some of them will be in operation. Pumps and compressors will round out the display. *In charge*—L. H. Geyer.

• **INTERNATIONAL HARVESTER CO.**

Will feature earth-moving equipment and auxiliary equipment. Included will be an International 2T-75 2-Wheel Rubber-Tired Tractor and 20-cu yd Bottom Dump Wagon, a TD-9 Tractor with Drott Model 9K-3 Mining Skid Shovel and Ruth Gas Conditioner, a TD-24 Tractor with International Cable Dozer, a UD-9A Power Unit with Palmer Generator, several power units and an Ingersoll-Rand Air Starting Attachment.

• **INTERNATIONAL NICKEL CO., INC., THE**

Exhibit background will consist of 12 photographic enlargements depicting some of the many uses of nickel and nickel alloys in the mining industry. Included will be applications in rock drills, crusher shafts, mine cars, skips, grinding mill liners and balls, classifier equipment, pumps and welding rods. *In charge*—J. R. Davis.

• **IOWA MANUFACTURING CO.**

Featured will be a Cedarapids Schrock Motorized Head Pulley. Also shown will be a working animation of a Cedarapids Double Impeller Impact Breaker, and a working model Cedarapids Screen. *In charge*—O. E. Whitney.

• **JEFFREY MANUFACTURING CO., THE**

Will feature a 58-ft long, 36-in. belt conveyor with pneumatic take-up; various types of new standard and impact absorption belt idlers; drive and conveyor chains; a traveling breaker plate crusher for reducing wet sticky materials; electric vibrating pan feeders in a run-around circuit; electric vibrating grizzly feeder; and mine fans and blowers. In addition, there will be other equipment of interest to the entire mining industry on display. *In charge*—J. E. M. Wilson.

• **JET-LUBE, INC.**

Display will center about new heavy-duty high-temperature water-resistant lubricants for use in the mining industry. Included will be multi-purpose and gear greases, thread compounds and specialized oils. *In charge*—Frank E. Bergeron.

• **JOY MANUFACTURING CO.**

Will exhibit three entirely new machines, new electrical controls and connectors for electrically driven slushers and new and improved models of existing lines of mining machinery. There will be a new rotary drifter for long-hole drilling, a new type blast hole drill for open-cut drilling and a new type of mobile drilling rig for underground drilling. Electrical connectors and start and stop electric control for electrically driven slusher hoists along with two of the latest Joy airlegs with push-button control will also be shown along with fans, blowers, single drum hoists, stoppers, sinkers and breakers. *In charge*—R. E. Campbell.

• **KANSAS CITY STRUCTURAL STEEL CO**

Will display photographs of outstanding mining and smelter jobs the company has performed in the past. *In charge*—Norman W. Funk.

• **KENWORTH MOTOR TRUCK CORP.**

Will exhibit a Kenworth Model 802 16-cu yd, 24-ton end dump truck, powered with the 300-hp Cummins engine and equipped with Allison torque converter and Torqmatic transmission.

• **KERN INSTRUMENTS, INC.**

With Rutico, Inc., will exhibit surveying theodolites, levels and other surveying accessories. *In charge*—Florian Davatz and Hans Rutishauser.

• **KOEHRING CO.**

Featured will be the Koehring Dumptrator, a 6-cu yd hauling unit for underground mines, open pit ledges and narrow haul roads. *In charge*—E. J. Goes.

• **LA ROE INSTRUMENTS, INC.**

Exhibit will feature portable scintillation detectors, portable aerial-mobile scintillation detectors, fixed installation aerial-mobile scintillation detectors and a portable scintillation-geiger probe combination detector for drill hole logging. *In charge*—Robert S. Foote.

• **LE ROI CO.  
CLEVELAND ROCK DRILL DIVISION**

Will exhibit a complete new range of single extension and telescopic Air Leg Drills. A 55-lb hand-held drill will be shown for the first time as will a new 90-lb Stopper drill. Other popular rock drills will be on display.

• **LESCHEN WIRE ROPE DIVISION  
WATSON-STILLMAN CO.**

Will display samples of Hercules Red-Strand wire rope and slings with a background of industry and Leschen plant photographs. *In charge*—Dalmar G. Berglund.

• **LETOURNEAU-WESTINGHOUSE CO.**

Two pieces of high-speed, rubber-tired equipment will be on display—the 200-hp Model C Tournatractor with bulldozer blade and the 200-hp Model C Rear Dump. *In charge*—F. W. Duke.

• **LINK-BELT CO.**

Will display a cross-section of a 60-in. belt conveyor capable of handling 100 tons of iron ore per minute. The background will consist of the ore-handling, crushing, storing and ship-loading system recently installed at Puerto Ordaz for the Orinoco Mining Co. Enlargements of vibrating screen installation, feeders and car dumpers will be included. *In charge*—L. O. Millard.

• **LINK-BELT SPEEDER CORP.**

Exhibit will highlight a backwall display incorporating colored transparencies of applications of Link-Belt Speeder units in open pit operations. A working display will demonstrate the complete system of Link-Belt Speed-O-Matic Power Hydraulic Control for shovel cranes. Also on exhibit will be a one-in. to one-ft model of a 1¼-yd K-375 dragline. *In charge*—Arthur H. Boike.

• **LONGYEAR CO., E. J.**

Exhibit will feature a new diamond core drill designed for exploratory core drilling to depths of 4000 ft. The Longyear Wire Line Core Barrel will also be shown and a core barrel display will illustrate how good core recovery can be obtained at reasonable cost in almost any ground. *In charge*—H. A. Kurtze.

• **LUDLOW-SAYLOR WIRE CLOTH CO.**

Will display a variety of samples of their Rek-Tang, Sta-Tru, Sta-Clear and Sta-Smooth Screens, together with

an assortment of square-opening and square-mesh grades of Industrial Wire Cloth, in cooperation with their California subsidiary, Star Wire Screen & Iron Works, Inc. Specially featured will be abrasion-resistant mining screens. *In charge—E. S. Robson.*

• **MARION POWER SHOVEL CO.**

Will feature a photographic display showing Marion equipment in action.

• **MAYHEW SUPPLY CO., INC.**

Will display their Hurricane rotary air drill for drilling blast holes in quarries, strip mines and open pits. *In charge—Charles Mayhew.*

• **MINE SAFETY APPLIANCES CO.**

Edison Electric Cap Lamps and the company's mine communications systems will be featured. Both the MSA MinePhone and MSA HoistPhone will be shown. *In charge—C. M. Donahue.*

• **MINING CONGRESS JOURNAL**

The monthly publication of the American Mining Congress invites the foot-weary visitor to "set and rest awhile". Copies of the magazine will be available. *In charge—J. C. Fox.*

• **MINING WORLD**

Will exhibit a high-grade specimen of uranium ore and a battery of fine quality scintillation counters with varying scale calibrations for radio-activity determination. Visitors are also invited to stop, to rest their tired feet, and look at photos of some of the world's foremost mining operations. *In charge—Max F. Holsinger.*

• **MOTOR GENERATOR CORP.  
HOBART BROTHERS AFFILIATE**

Will feature Hobart Automatic Battery Chargers for industrial and mine locomotive batteries. On display will be a Single-Circuit Automatic Motor Generator Set of two-kw capacity designed for eight-hr charging of a 20-cell lead-acid battery of up to 260 amp-hr capacity. *In charge—Howard Toneray.*

• **NAGLE PUMPS, INC.**

Exhibit will feature mining pumps for abrasive, corrosive, or hot material. *In charge—Perry Nagle.*

• **NATIONAL MALLEABLE AND STEEL CASTINGS CO.**

On display will be full-size assemblies of Willison Automatic Couplers and National Rubber Draft Gears. Also on exhibit will be the National NC-1 truck, with air brake attachment, for eight-wheel large capacity mine cars, the NC-1A truck for smaller cars, cast steel sintering pallet, and Capitol Foundry Co. Mallix grate bars and cast alloy steel grinding balls.

• **NEW YORK AIR BRAKE CO.**

With its manufacturing units, the Watertown Division, Dudgeon Division, Hydrex Division, Kinney Division and the Aurora Pump Co., will exhibit hydraulic control equipment, liquid handling pumps and vacuum pumps. Included will be heavy-duty Dual-Vane gear and piston pumps and motors for pressures up to 5000 psi. *In charge—Robert L. Firth.*

• **NORDBERG MANUFACTURING CO.**

Will feature the theme "Engineered for Profitable Operation", pointing up the company's line of mine hoists,

Symons Cone Crushers, screens and grizzlies, grinding mills, gyratory crushers, and diesel engines. Models of the machinery will be shown. *In charge—R. E. Schulz.*

• **NORTHWEST ENGINEERING CO.**

A built-up background with colored pictures will feature the company's shovels, cranes, draglines and pullshovels. *In charge—A. G. Crowley.*

• **OHIO BRASS CO.**

Will feature a complete display of overhead trolley wire fittings, aluminum and copper feeder cable fittings, rail bonds and collectors for locomotives. Fused taps and rail clamps will be displayed as will expansion shells and plugs for roof bolting. *In charge—J. H. Sanford.*

• **OLIN INDUSTRIES, INC.  
EXPLOSIVES DIVISION**

Will feature a representative display of dynamites and blasting caps. One display will depict the various steps in the manufacture of dynamite. *In charge—A. J. Barocca.*

• **OLIVER UNITED FILTERS, INC.**

Will exhibit a cutaway section of the Oliver Centriclone, a modification of the conventional liquid cyclone. Scale models of new types of industrial filters used in the metallurgical fields will be shown. *In charge—C. W. Crumb and J. B. Hoxie.*

• **PIONEER ENGINEERING WORKS, INC.**

Exhibit will consist of a quarter scale operating model of a complete crushing and screening plant featuring fully authentic reproductions of the Pioneer line of Oro manganese steel feeders, jaw crushers, triple roll crushers, vibrating screens and conveyors. In addition, some of the items of the company's new line of conveyors and materials handling equipment will be displayed. *In charge—W. A. Rundquist.*

• **PRECISION RADIATION INSTRUMENTS, INC.**

Will present a line of Geiger Counters, drill hole counters, and Scintillators. Featured will be the Model 118 Royal Scintillator for uranium prospecting and for investigating the radiation pattern around oil fields. *In charge—L. Norman.*

• **RAYBESTOS-MANHATTAN, INC.  
MANHATTAN RUBBER DIVISION**

Will introduce its latest development, the Poly-V Drive, a new type belt drive. In addition the company will exhibit latest conveyor belt developments and its general line of industrial rubber products. *In charge—A. L. Hawk and S. V. V. Hoffman.*

• **REICH BROS. MFG. CO.**

Featured will be a truck mounted heavy duty rotary blast hole drill and complete information on 25 other models of truck and crawler mounted equipment. *In charge—Wendell L. Reich.*

• **RELIANCE ELECTRIC AND ENGINEERING CO.**

Plan to use a mobile display bus to show equipment ranging from specific purpose ac and dc motors to Reliance Adjustable-Speed V-S Drives and electronic regulators. Featured will be a motor which incorporates a built-in starter for mining applications. A new explosion-proof totally-enclosed fan-cooled ac motor for use with pumps, compressors, blowers, and fans will also be displayed, as will a Reliance Taconite Motor designed to keep bearings and interior free of metallic dust.



• **ROEBLING'S SONS CORP., JOHN A.**

Will display a comprehensive range of wire rope constructions and electrical wire and cable for mining applications. *In charge—Albert Neroni.*

• **SANFORD-DAY IRON WORKS, INC.**

A plastic model of the company's latest design Granby type car, employing outside frame construction with the frame supported on spring boxes outside the wheels, will be featured. Also shown will be a working model of the company's 1-2-3 drop bottom car and various models of the S & D Ball Bearing wheels. Equipment from the Brown-Fayro Division of the company will also be shown. *In charge—W. D. Moreman.*

• **SIMPLEX WIRE & CABLE CO.**

Featured will be many samples of Tirez Cured-in-Lead Portable Cords and Cables used in both underground and open pit mining. Also shown will be samples of Simplex-Anhydrex Power Cables for use in shafts. *In charge—E. J. Mackenzie.*

• **SROOKUM CO.**

No description available.

• **SMITH ENGINEERING WORKS**

Exhibit will include a new sectionalized working model of the Gyrasphere Crusher. *In charge—H. H. Schaper.*

• **SOUTHWESTERN ENGINEERING CO.**

Display will feature the company's broad range of services as engineers and constructors-manufacturers in the field of mining and metallurgy. Screening action of the Sweco separator will be demonstrated with a 48-in. operating unit. *In charge—H. V. Hughes.*

• **STEARNS MAGNETIC, INC.**

Will exhibit a Cross Belt Magnetic Separator for separating weakly magnetic ores, a permanent magnetic suspended cross-belt separator for the automatic removal of tramp iron, an electro magnetic pulley designed for use in conveyor systems, and cut-away models of a new style magnetic brake. *In charge—William Bronkala.*

• **STEPHENS-ADAMSON MFG. CO.**

Exhibit will include new type Simplex Carriers and a running sample of the company's Amsco all manganese heavy pan feeder. Also shown will be samples of the Stephens-Adamson Sealmaster anti-friction bearings. *In charge—E. C. Barkstrom.*

• **STOODY CO.**

Featured will be demonstrations of actual welding on mine equipment by means of the Stooddy Magnecote process. Fluxes for both build-up and hard-facing will be demonstrated. There will also be a display of various hard-faced equipment of interest to the mining industry. *In charge—A. W. Anderson.*

• **STRATOFLEX, INC.**

No description available.

• **THOMAS FLEXIBLE COUPLING CO.**

No description available.

• **THOR POWER TOOL CO.**

A completely air-operated double-boom mining jumbo equipped with two Thor power feed drifter rock drills will be featured. Also shown will be the new Thor No. 380 one-

man drilling machine, a new Raiser Leg for stoping operations, a complete series of sinker legs, air bar feeds for drifting and pneumatic columns, and the company's standard line of sinkers, stopers, drifters, sump pumps and impact wrenches. *In charge—B. H. Johns.*

• **TIMKEN ROLLER BEARING CO.**

Will display a complete line of carbide insert and multi-use rock bits. Both types are designed to be interchangeable in the same thread series and both fit the same drill steel. *In charge—W. G. Turner.*

• **TOOL STEEL GEAR AND PINION CO., THE**

Included in the exhibit will be cutaway sections of all types of mining parts manufactured by the company showing depth of hardness and degree of hardness for long wearing parts. In addition, there will be many mining parts shown made up for actual usage. *In charge—John C. Seeger.*

• **TRACTOMOTIVE CORP.**

Two Tracto-Loader machines will be exhibited. One has a ¾-yd bucket, two-Wheel Front Wheel Drive, Rear Wheel Steer for loading loose stock pile material in areas with good footing. The other has four-Wheel Drive, Rear Wheel Power Steering for loading and light excavating where ground conditions are relatively rough.

• **TRAYLOR ENGINEERING & MFG. CO.**

Will have a photographic display featuring copper converters, kilns, ball mills and roll crushers. *In charge—C. H. Roberts.*

• **TWIN DISC CLUTCH CO.**

Will display a plastic working model of the Twin Disc three-stage hydraulic torque converter. Other display units will show aluminum fluid couplings, Hydro-Sheave drives and industrial friction clutches. *In charge—P. G. Tyrrell.*

• **TYLER CO., THE W. S.**

Featured will be the latest model Ty-Rock Screen used in the mining industry. Samples of Woven Wire Screens of many different metals and meshes along with a Ro-Tap Testing Sieve Shaker and Tyler Standard Screen Scale Testing Sieves will complete the exhibit. *In charge—Bryant Currier.*

• **U. S. BUREAU OF MINES**

Will display various types of rock bolts used in metal mining. Also shown will be bolt testing equipment. Bureau personnel will be on hand to talk over rock bolting problems.

• **UNION WIRE ROPE CORP.**

Will feature a Tuffy Sling display board showing the many types of slings which the company manufactures and the fittings that go with them. Also shown will be a new Sling Saddle and Newco Wire Rope Clamps.

• **UNITED STATES RUBBER CO.  
MECHANICAL GOODS DIVISION**

Featured will be the U. S. Belt Surgeon who will demonstrate the splicing of conveyor belts. On display will be the U. S. Super Ustex-Nylon conveyor belt and U. S. Uscolite pipe line, packings, hose, V-belts and tapes. *In charge—H. E. Dadson.*

• **UNITED STATES STEEL CORP.  
COLUMBIA-GENEVA STEEL DIVISION**

Will exhibit a variety of products emphasizing the econ-



omy of selected steels. Carilloy T-1, a new alloy plate steel, will be introduced in this exhibit. High Strength steels, stainless steel, wire rope, tramway cable, electrical cable, mill liners, floor plate, roofing and siding will also be shown. *In charge—H. B. Montross, Jr.*

• **THE VAREL MANUFACTURING CO.**

Will display new small rotary cone-type Varel rock bits of 2½-in. diam with A-rod pin and 3½-in. diam bits with N-rod pin. There will be a complete range of larger sizes on up through 12¼-in. diam. Also on exhibit will be a complete range of types and sizes of Varel bits including the air-blast design for use in rotary drilling. *In charge—T. Jack Brown.*

• **VASCOLOY-RAMET CORP.**

Display will cover Vascoloy-Ramet tungsten carbide mining tools for mineral and nonmetallic mines. *In charge—R. O. Moore.*

• **VICTAULIC CO. OF AMERICA**

Will feature the Victaulic Method of Piping including Victaulic couplings, Snap-Joint couplings, Roust-A-Bout Couplings, Victaulic fittings and Vic-Groover portable tools. *In charge—Dick English.*

• **WAUKESHA MOTOR CO.**

Featured will be the company's new Model 135-DKBS diesel engine developing 185 hp at 2800 rpm. Sharing the spotlight will be the 1197-in. turbocharged Model WAKDBS diesel. *In charge—A. G. Mulkey.*

• **WEATHERHEAD CO., THE**

Plan to feature the CS-10 Cutting and Skiving Machine for preparing fabric or wire braid hose for reusable hose assemblies. Also featured will be a portable storage cabinet for hose and couplings, Ermeto high-pressure flareless fitting, a line of brass tube and pipe fittings, drain and shut-off cocks and industrial hose and reusable couplings. *In charge—Ralph Conrad and Joe Harzan.*

• **WEDGE WIRE CORP.**

Will feature their line of equipment for the mining industry. *In charge—Joe E. Parker.*

• **WESTERN GEAR WORKS**

Exhibit will consist of the company's complete line of mechanical power transmission equipment including par-

allel shaft speed reducers, right angle speed reducers, speed increasers, high speed units, variable speed drives, Cone type reducers, couplings, gears of all types, torque converters and special transmissions.

• **WESTERN-KNAPP ENGINEERING CO.**

Display will feature "plan-to-mill" sketches, drawings and photographs. Company engineers will be present to discuss engineering, design and construction of mining and metallurgical plants. *In charge—Charles Skinner.*

• **WESTERN MACHINERY CO.**

Exhibit will include a Wemco SH Classifier in operation, a Lucite model of a heavy media separation plant with drum type separator in simulated operation, a Wemco Fagergren Cell with glass front section to observe rotor-stator assembly and action in operation; an operating model of the newly developed Wemco Solids Pump; a new style Wemco Diaphragm Pump; and a Wemco Laboratory Attrition Machine in operation. *In charge—R. W. Hernlund.*

• **WESTERN ROCK BIT MANUFACTURING CO.**

Will display the Liddicoat bit and the Liddicoat tungsten carbide insert bit. A McGee-Hogan grinder for preparing drill steel for the Liddicoat bit will be in operation. *In charge—M. W. Hawkesworth.*

• **WESTINGHOUSE ELECTRIC CORP.**

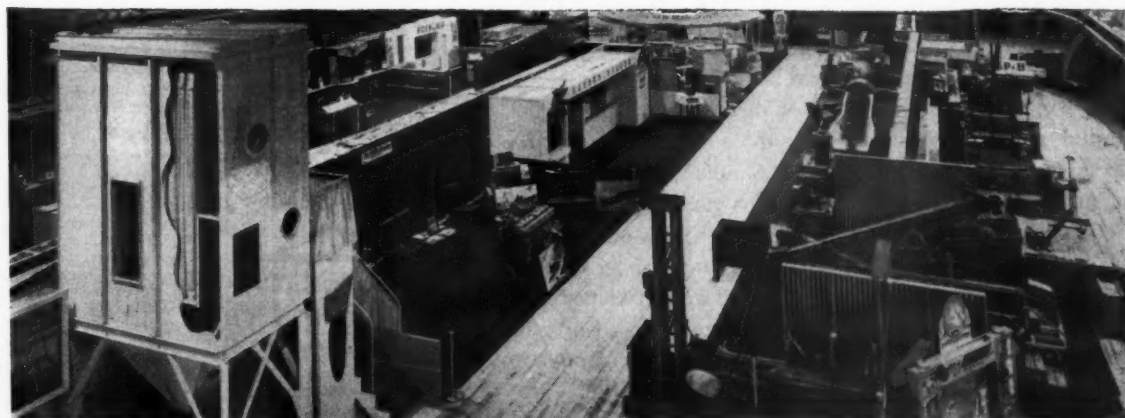
Will feature a Phonomic presentation of the manufacturing and service facilities available at the company's Sunnysvale Plant. Also shown will be the company's new Life-Line "A" motor and a new dc sectionalizer as well as control centers, gearmotors and a special slusher hoist motor. *In charge—R. T. Ervin.*

• **WILD SURVEYING INSTRUMENTS SUPPLY CO. OF AMERICA, INC., HENRY**

Exhibit features Swiss made Optical Surveying instruments including the model T-1 Optical Repeating Transit. Special mining attachments such as the Pentagonal Objective Prism and targets for shaft triangulation will be demonstrated. *In charge—H. P. Tanner.*

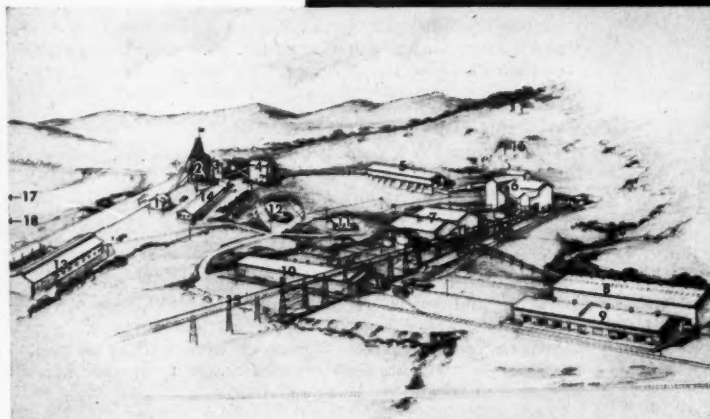
• **YUBA MANUFACTURING CO.**

Exhibit will include one Yuba M-82-cell Mineral Jig complete with gearmotor drive and operating to demonstrate the action and control features. In addition, the Yuba-Schrock Motorized Pulley, internally driven by a 10 hp motor, will be shown operating under wet conditions. *In charge—George J. Maggioli and P. C. Carmer.*



Make the most of the opportunities afforded to study modern equipment and supplies

**Tanganyika Elephants  
couldn't tear this up!  
...SWECO saw to that**



The threat of marauding elephants was just one of literally thousands of details considered by SWECO in designing, engineering and procuring more than \$2,000,000 worth of equipment, materials and supplies for the complete 1,200 ton/day lead-copper concentrator of Uruwira Minerals, Ltd. ... 800 miles inland, in the bush of Tanganyika, Africa. Water is piped 43 miles to the project from the Ugalla River, over rough terrain, varying 1000 feet in elevation. The water pipes and two 500,000 gallon reservoirs are buried to protect them from thirsty elephants during drought seasons. Water supply was one of many problems which SWECO engineers solved in setting up complete, integrated plans and specifications for concentration mill, utility services and all off-site facilities—a 2000 kw power plant—a village for 5000 workers, complete with housing, school, hospital—attractive California-style three-bedroom houses for 200 supervisory personnel and their families. SWECO specified, purchased and coordinated shipping of more than 3,000 tons of equipment and supplies from all parts of the United States, everything from structural steel and forming lumber to hand tools and nails. The thoroughness, speed and efficiency with which SWECO handled the Uruwira Minerals project are the result of 30 years of engineering, construction and manufacturing services to process industries throughout the world.

*Send for bulletin giving details of SWECO engineering-construction and manufacturing services.*

#### Under construction in Central Africa

This perspective drawing shows part of the integrated lead-copper mine, mill and off-site facilities engineered by SWECO for Uruwira Minerals, Ltd., at Mpanda, Tanganyika, Africa:

- |                                         |                                           |
|-----------------------------------------|-------------------------------------------|
| 1 Hoist house                           | 10 Shops                                  |
| 2 120' headframe                        | 11 Main office                            |
| 3 Jaw crusher                           | 12 Survey office                          |
| 4 Cone crusher                          | 13 2000 kw power plant                    |
| 5 3000 ton ore storage                  | 14 Change house                           |
| 6 sweco designed heavy media separation | 15 Tailings conveyor                      |
| 7 Grinding and flotation                | 16 Reservoir                              |
| 8 Concentrate storage                   | 17 Village for 5000 workers               |
| 9 Warehouse                             | 18 Housing for 200 personnel and families |

#### Sweco engineering team (above)

This project group evaluated preliminary flow-sheets, developed detailed plans and specifications, procured and supervised the shipping of all materials required to create the big Uruwira lead-copper mill and a complete new town.



Serving industry in the fields of Petroleum ... Chemicals ... Mining and Metallurgy ... Food ... Rock Products ... Ceramics ... Paper and Pulp ... Textiles ... Lumber ... Rubber

#### Southwestern Engineering Company

Engineers and Constructors  
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#### SWECO PRODUCTS

Heat Exchangers  
Custom fabrication of all types of steel and special alloy vessels for the process industries.  
Screen Separators.



## Break it up to bite size...with APEX®



**VERSATILE** APEX explosives are an important factor in the amazing improvements in breakage now possible with the newest Atlas development ... Alternate ROCKMASTER® combined with Alternate Velocity Loading.

Apex is an economical ammonium nitrate explosive with a patented assembly having a water-proof gelatin core that offers these advantages:

- The water-proof core promotes complete detonation of the explosive in wet holes.
- Complete propagation of the column in any height face.
- Fluted-end cartridge permits easy loading.
- A wide range of strengths and velocities to choose from. Apex is available in 8 strengths: each in low, medium and high velocity.

For maximum breakage, better control of throw and economical production, team APEX explosives with the ROCKMASTER Blasting System.

For complete information on all Atlas Explosives Products, ask your Atlas representative for a copy of the new Atlas Explosives Catalog.



## ATLAS EXPLOSIVES

*"Everything for Blasting"*

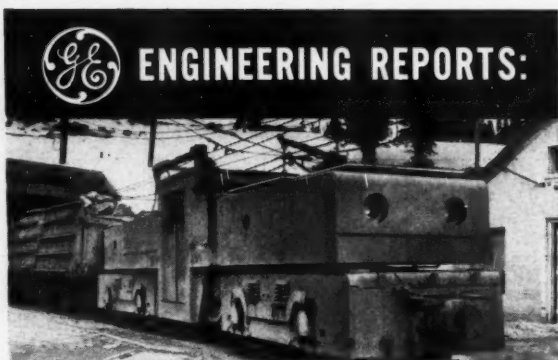
ATLAS POWDER COMPANY,  
WILMINGTON 99, DELAWARE

*Offices in principal cities*





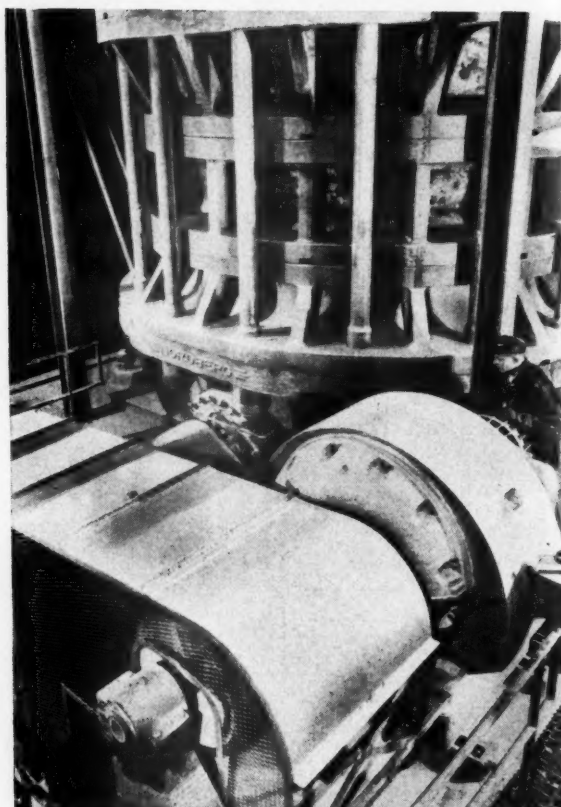
## ENGINEERING REPORTS:



**1 SEVEN SPECIALLY-DESIGNED 20-ton G-E mine locomotives** provide maximum efficiency and safety. Center cab assures maximum visibility, is weather-proofed and heated.



**2 GREATER ORE HAULAGE** is provided by fast, new G-E locomotives. Each pulls 20, 10-ton cars per trip—and increases the trips per day.



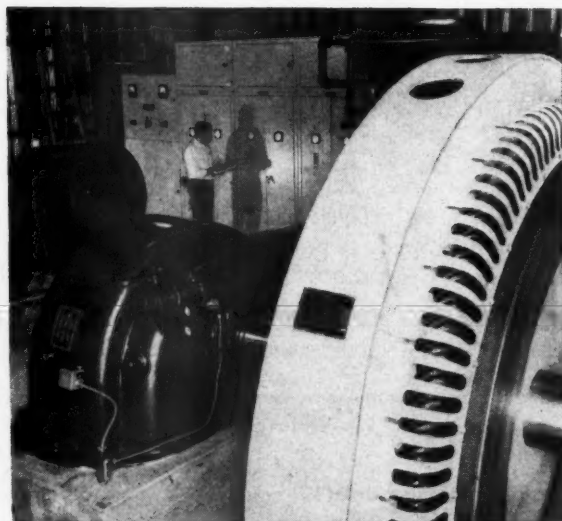
**3 WORLD'S LARGEST GYRATORY CRUSHER**, driven by dependable G-E 500-hp Tri-Clad\* wound rotor motor, is a key feature of the Climax expansion program.

\*Reg. trade-mark of the General Electric Company

# Climax Molybdenum expands,

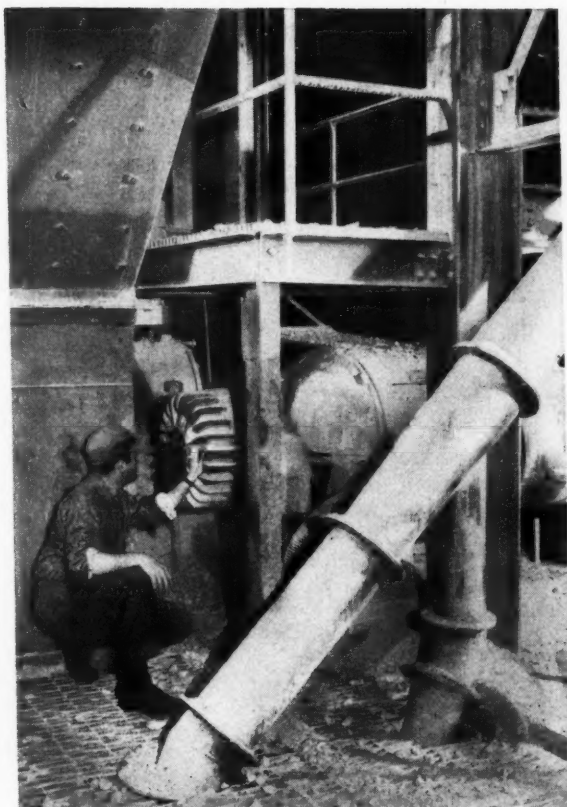


**7 HIGH EFFICIENCY** is provided in flotation cells by G-E  $7\frac{1}{2}$ -hp squirrel-cage motors—an important factor in round-the-clock operation. Convenient, individual oil-tight controls enable motors to be reversed when necessary.



**8 AIR COMPRESSORS** at Storke Level are driven by G-E synchronous motors, one 500-hp and one 600-hp in foreground. D-c power for Storke Level locomotives is provided by 300-kilowatt G-E mg set through G-E control (background).

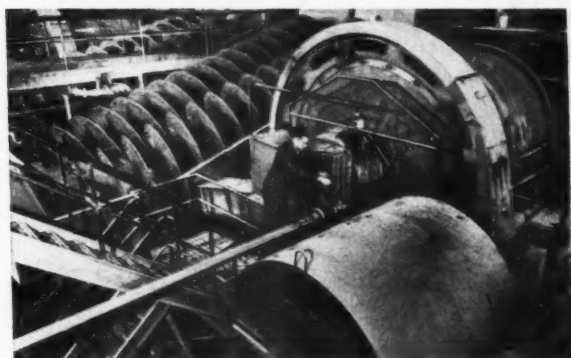




**4 SPECIAL CONE-CRUSHER DRIVE** assures a minimum of interruptions and less maintenance. Enclosed collectors on G-E Tri-Clad wound rotor motor helps protect against dust.



**5 PRODUCTION CONTINUITY** is provided by enclosed, heated conveyors driven by 350-hp and 250-hp motors. These carry ore from Storke Level crusher to final-stage crushing.



**6 HEAVY-DUTY G-E MOTOR**—500-hp, 300-rpm—under enclosure (foreground) drives this large ball mill which is in closed circuit with classifier.

## hits record 23,000 tons a day

**Co-ordinated G-E electrical system plays key part  
in setting record output of mine and mill**

A multimillion-dollar expansion program now in process has enabled the Climax Molybdenum Company, Climax, Colo., to reach a record output of 23,000 tons of raw molybdenum ore per day. It will become one of the world's largest underground mines with a daily output of 28,000 tons when the program is completed. Instrumental in making this output record possible were General Electric application engineers who worked closely with Climax engineers to co-ordinate the project's electrical system.

In this remote mountain location, with operating points great distances apart, the G-E electrical system

has helped integrate the mining and milling processes into a smooth-flowing production line. By providing reliable, 24-hour-a-day operation, co-ordinated G-E electrical systems helped to step up daily production as much as 5000 tons within the last two years—another example of the value of system planning.

The same G-E engineering leadership which helped Climax reach its record output is available to you for your expansion or modernization planning. Contact your Apparatus Sales Representative at your nearest G-E Apparatus Sales Office—early in the planning stage. General Electric Co., Schenectady 5, N. Y.

660-30

**Engineered Electrical Systems for the Mining Industry**

**GENERAL  ELECTRIC**

# You've Really Got a Leg to Stand On

when you use a **CP Airleg**



Engineered to withstand constant recoil shock yet hold the drill firmly to the work, the CP Airleg affords the maximum drilling efficiency obtained when using Tungsten-Carbide bits. An exclusive pressure release type control handle assures balanced feed-leg pressure and full bit contact to prevent "slapping" and minimize the danger of fracturing tungsten-carbide bits. An emergency push button releases feed-leg pressure in an instant. Available with feed cylinder of either steel or aluminum alloy and with 36" and 48" feed travel, the Airleg is ideal for use with CP Sinkers. For information, write *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, New York.*



**Chicago Pneumatic**

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# IMPOSSIBLE WITHOUT EXPLOSIVES

Modern explosives, conceived through continuous research, have become an important key to efficiency and economy in mining, quarrying, construction, and petroleum projects. The development of large-scale mining operations at Climax Molybdenum is an example of the mighty power of explosives and their scientific application.

For 40 years, the development, manufacture, and practical application of explosives have been Hercules' business. Our representatives welcome the opportunity to consult with you on blasting problems.

## **HERCULES POWDER COMPANY**

INCORPORATED  
*Explosives Department, 922 King St., Wilmington 99, Del.*

Birmingham, Ala.; Chicago, Ill.; Duluth, Minn.; Hazleton, Pa.; Joplin, Mo.; Los Angeles, Cal.; New York, N. Y.; Pittsburgh, Pa.; Salt Lake City, Utah; San Francisco, Cal.



XXV-6-G





## "I was promised delivery today,

but now I'm told you've no stock of one rope and only half enough of another. This delay is costing me money and plenty of it. From now on it's Roebling for me!"

\*\*\*

You can count on prompt and full delivery of Roebling wire rope. Your nearest Roebling office and distributor will help you choose the rope that will perform and stand up best in mining service. And you'll get what you want, when you want it — straight from nearby warehouse stock.



# ROEBLING




Subsidiary of The Colorado Fuel and Iron Corporation



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BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 331 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.





**BEFORE:** Face of metal mine drilled, loaded and connected up, ready for setting off the charge with Du Pont CD-32 Blasting Machine.



**AFTER:** Result of 44-hole shot connected in two series of 22 caps in parallel.



**FIRING**—operator depresses charging switch, waits until pilot light glows, then throws firing switch.

*Midwest metal mine reports:*

# Du Pont CD Blasting Machine Gives Extra Measure of Safety

**Saves money, promotes efficiency, too**

Safety is a prime consideration in mining. This midwest metal mine bought a Du Pont CD-32 Blasting Machine for greater efficiency and economy, of course, but maximum safety was the main reason. They have realized all three advantages.

**Here's why:** Du Pont CD (Condenser Discharge) Blasting Machines

1. Have extremely high capacity for their weight and size.
2. Have no moving parts.
3. Eliminate the human element of generator-type machines.
4. Have a pilot light which indicates to the

operator when to fire the blast.

**5.** Have many important safety features included in the wiring and switching system.

**6.** Can be used for firing shots connected in series, parallel, or parallel series.

**7.** Eliminate need for installation and maintenance of power-firing circuits.

The CD-32's only one of the four dependable Du Pont CD Blasting Machines now serving the industry. All are designed to increase safety, economy and efficiency—and one of them's made to meet *your* needs. To get the facts on all four, contact the Du Pont Explosives representative in your district or write: E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

1954 AMERICAN MINING CONGRESS SHOW  
San Francisco Civic Auditorium—Sept. 20-23  
*Be sure to visit us at Booth 801.  
We're looking forward to seeing you.*

**DU PONT  
EXPLOSIVES**

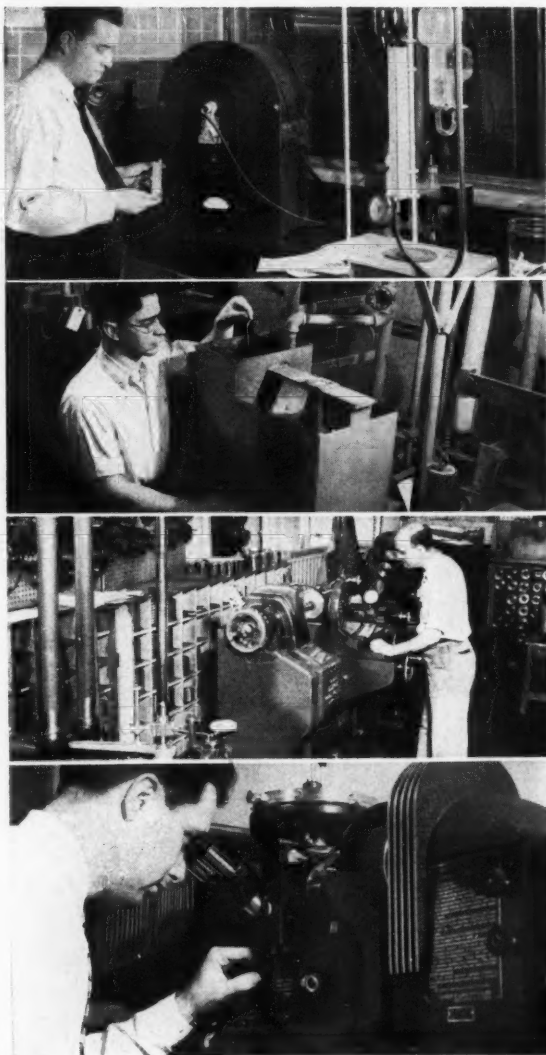
*Blasting Supplies  
and Accessories*



BETTER THINGS FOR BETTER LIVING  
... THROUGH CHEMISTRY

*At Allis-Chalmers*

## **Good Gear Performance is No Accident**



### **PROVED IN THE FIELD**

The final and most important test for any gear is its performance under actual job conditions. In Allis-Chalmers tractors, motor graders and Motor Scrapers, the quality of their gears is proved by long, efficient service on the toughest earth-moving jobs.

Technical and practical experience like this, coupled with the most modern heat-treating and manufacturing facilities, adds hours of maintenance-free performance to Allis-Chalmers earth-moving equipment.

Write for complete literature on any unit in the Allis-Chalmers line.

### **APPROVED IN THE LAB**

From design through production, Allis-Chalmers engineers know their gears inside and out. Here are a few of the modern laboratory tests and inspection techniques by which their quality is controlled:

#### **Carbon Content Test**

With this apparatus, Allis-Chalmers engineers can determine the carbon content to within .01 percent. Steel must have correct carbon content to insure heat-treating to proper strength and hardness.

#### **Quench Test**

To help insure complete control over the quality of finished gears, all steel must meet specified hardening characteristics, determined here by the "End Quench Hardenability Test."

#### **Dimension Test**

Cutting tools used to make the gears, as well as the gears themselves, are measured in the gear laboratory. With this precise dimension control, Allis-Chalmers can mass-produce gears that are correct to 1/10,000 of an inch.

#### **Metal Grain Test**

Sections cut from finished gears are examined under metallurgical microscopes which magnify from 10 to 2,000 times. This test gives assurance of proper and uniform quality of grain structures in hardened gears.



**ALLIS-CHALMERS**  
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.





Central Shaft collar at Hamme Mine is 75 ft above Sneed Shaft collar

# Tungsten Mining in North Carolina

**Output of 800 Tons a Day Makes Hamme Mine of Tungsten Mining Corp. Country's Leading Tungsten Producer**

By **JAMES R. SWEET**  
General Manager and Vice-President  
Tungsten Mining Corp.

**TUNGSTEN** Mining Corp., from its Hamme mine, produced 23 percent of the total domestic tungsten concentrate in the United States during 1953—and was the leading producer for that period. Production from this operation, for 1954 to date, is at an annual rate 9 percent above last year.

Huebnerite is the principal ore mineral, with scheelite present in a minor percentage. Tungsten concentrate is the corporation's only economic product.

The Hamme Mine was named after the two Hamme brothers who discovered the deposit in May 1942. It is located at Tungsten, N. C., 16 mi northwest of Henderson, N. C., and two mi south of the Virginia State line.

In August 1943, the Hamme properties comprising some 1650 acres and extending about 12,000 ft along the

strike were acquired by Haile Mines, Inc. In June 1945, Haile Mines and the General Electric Co. formed a new company, Tungsten Mining Corp., in which Haile Mines holds an approximate 70 percent interest and General Electric 30 percent.

Hewitt S. West, president, and W. Lunsford Long, vice-president and general counsel, have been associated with the enterprise from its beginning—through the early exploration of the prospect and its subsequent development to the status of a substantial producer. To date the property has produced 577,000 short ton units of tungsten trioxide valued at \$27,500,000.

In January 1951, it was decided to increase the capacity of the operation. This expansion program required accelerated development of the mine, increased crushing and milling capacity

and additional capacity for the supporting service units. This work had to be done without a decrease in current production.

In December 1952, this expansion program was essentially complete and the production of the plant was increased. During 1953, after the installation of additional shaft hoisting facilities, the two vertical operating shafts were deepened from the 900 level to the 1625-ft. The completed expansion program increased production from 300 to 800 tpd.

## Mine and Plant Services

Electric power is supplied by the Carolina Power & Light Co. Transmitted at 22,000 v to the company-owned sub-stations located at the property it is distributed from there at 480 and 2400 v. Power is transmitted underground at 2400 v to dry-type transformers and generally distributed at 480 v. The capacity of the sub-stations is 3300 KVA. The power demand is about 1900 KW and monthly consumption is slightly above 100,000 KWH.

Compressor capacity is 5224 cfm, delivered, and has a connected power load of 975 hp. Air is compressed to 110 psi gauge.

Industrial water is obtained from two pumping stations located on different creeks, the pumping distances being 2700 and 2400 ft and the pumping static head is about 200 ft in each case. Most of the water that the mine makes, only about 80 gpm, is also pumped into the industrial water system. The plant consumption of water is about 1300 gpm. Domestic water is obtained from three shallow six-in. bore holes.

The assay laboratory makes all re-



quired assays. Analyses of samples of all shipments of concentrate, mill control samples, mine car grab samples and samples from diamond drill cores are included in the work of this laboratory.

Mine and plant supplies are generally delivered directly to the plant by truck. All railroad freight is delivered to Henderson and hauled by company truck to the mine. Shipments of concentrate are made directly from the mill by truck to their destination. Mine timber, native oak, is obtained locally and is delivered to the plant in sawed sizes. The property is served by two hard surfaced State roads.

The major labor supply is obtained locally from the surrounding farming area and industrial districts. Some labor is obtained from the mining areas located in the western part of the State.

A small machine shop and carpenter shop is provided. For major machine work and electrical repair work, good service is available in the nearby cities.

The company maintains a limited number of dwellings on the property for part of the staff personnel and a number of other key employees. A combined store and post office is located on the property and is operated independently of the company. The employees have a church adjacent to the plant. Children living at the property attend school at Townsville, three miles away.

### Most Veins in Gneiss

The Tungsten district is located in the northwestern part of Vance County, N. C., extending northward into Virginia. The district lies in the Piedmont province about 50 mi west of the Coastal Plains. The relief of the region is gentle. The elevation at the mine is about 436 ft. The rock types of the area are schist and a granite-gneiss complex. The western part of the area is underlain by schist and the eastern part by the plutonic complex. The contact line of the schist and the granite-gneiss roughly establishes the western limit of the tungsten district. Most of the tungsten veins developed are found in the gneissoid rocks.

The tungsten district is just under eight mi long and about one mi wide. It trends in a general direction of N-12°-E, and extends into the State of Virginia for over a mile. The Hamme Mine, now developed through a distance of 5900 ft, lies in the central part of the district.

The strike of the contact between the schist and the granite-gneiss complex is slightly east of North over the length of the district. In the central part of the district, the contact curves convexly to the west. The foliation of the schist and of the gneiss generally strikes in the northeast quadrant.



Management Team, Tungsten Mining Corp. Left to Right: J. V. Hamme, Mill Supt.; G. V. Boyd, Office Mgr.; B. B. Bailey, Asst. to Gen. Mgr.; J. R. Sweet, Gen. Mgr. and Vice-Pres.; C. D. Hulin, Consulting Geol.; W. L. Long, Gen. Counsel and Vice-Pres.; A. M. Szyrkowski, Chief Engr.; J. C. O'Donnell, Mine Supt.

### Ore in Shear Zones

A main shear zone extends from the schist-gneiss contact with a general trend of N-30°-E to N-40°-E through the district. The shear zone may range in width up to 50 ft; sometimes more. These general relations result in the shear zone diverging easterly from the schist-gneiss contact and also from the strike of the foliation of the enclosing rock through which it passes. In the northern section of the present mining area a second shear zone extends west-southwest from the main shear structure. Important orebodies are found in both shear zones.

Many mineralized quartz veins outcrop at the surface and in such places there was an abundance of highly mineralized float. There are also many strong quartz veins that outcrop in the district which are apparently barren of any tungsten mineralization.

The tungsten deposits are huebnerite-quartz veins. Quartz is the dominant gangue mineral with subordinate amounts of fluorite, rhodochrosite, and sericite. Huebnerite is the principal tungsten mineral and is accompanied by a minor amount of scheelite. Pyrite is the predominate metallic mineral found in the veins and is accompanied by lesser amounts of chalcopyrite, galena, sphalerite and tetrahedrite. The occurrence of molybdenite is extremely rare.

Ore occurrences consist of irregular discontinuous veins or lenticular bodies which occur in the several shear zones. No uniform pattern can be recognized in the frequency of occurrence and distribution of the orebodies along the shear zone. The lenses of ore vary widely in size. The largest lens so far developed has a maximum strike length of 830 ft and widths locally as much as 40 ft. This lens has been proven continuously from the surface to the 700-ft level

and in the near future will be explored on the 900-ft level.

In the main shear zones, the veins strike northeasterly and the dip is from 65° to 75° to the eastward. Some of the ore lenses have a fairly well defined rake to the southwest, while others in their irregular outline lack this structural feature. The ore lenses are generally slightly divergent from the general strike of the shear zone, and furthermore, the lenses usually transgress the foliation of the country rock, the ends of the lenses feathering out along the foliation. In some instances the lenses might be parallel or overlapping. In other cases, they are *en echelon* and are separated by varying distances, sometimes by large.

The veins in the southwesterly shear zone have a more variable attitude than those in the main shear zone. Their strike generally conforms with that of the shear zone and their dip varies from 40° to vertical.

The tungsten mineralization of the quartz veins is not uniform and the tungsten content varies over a rather wide range. The huebnerite occurs as erratically distributed crystals embedded in quartz; the crystals range up to five in. in length and one in. in diam. The scheelite often occurs as a thin coating on the huebnerite crystals and as filling of minute fractures cutting the crystals. Banding of the veins is not uncommon and frequently the huebnerite is concentrated along certain bands within the veins.

The walls of the veins have commonly been sheared and altered to a sericitic schist through a thickness ranging up to several feet. In such cases the walls are weak and in subsequent mining operations must be supported.

The structures provided by the strong shear zones that traverse the country rocks are probably the predominant factor controlling the formation of the deposit. Along the

shear zones local changes in strike may occur and apparently these changes in strike in conjunction with the movement that occurred along the shear zones resulted in favorable loci for the formation of orebodies.

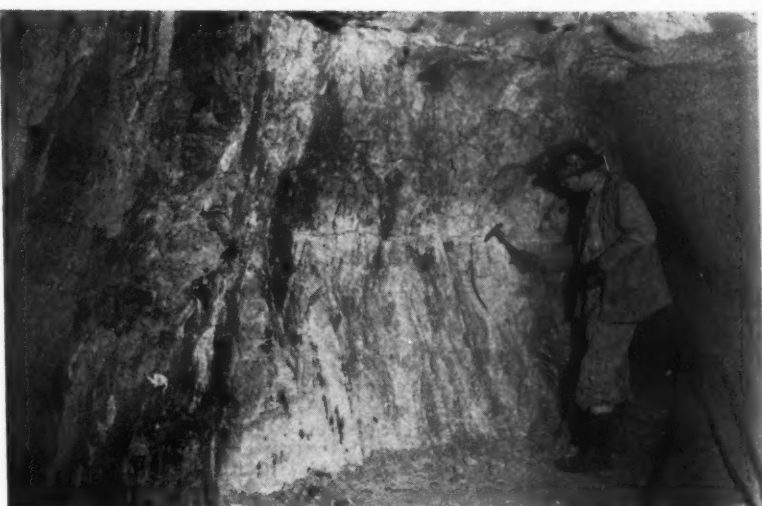
There are a number of diabase dikes in the area having a northerly trend which are up to several hundred feet in thickness. They are of post-mineral age cutting the veins and all other rocks. These diabase dikes follow fissures which in most, if not in all cases, were of post-mineral formation. In consequence the dike intrusion results only in a break in the continuity of the vein amounting to the thickness of the dike.

As indicated above, the mine is principally located along the strike of two shear zones. The development of the mine is through two vertical shafts, the Sneed Shaft and the Central Shaft, located 3350 ft apart;—these shafts are also referred to as the No. 6 and No. 7 Shafts.

The Sneed Shaft is located in the southern section of the mine and is collared a short distance in the footwall of the main shear zone. The Central Shaft is located in the northern section of the mining area, approximately midway between the two shear zones. The elevation of the collar of the Sneed Shaft is 75 ft less than that of the Central Shaft. The ore is hauled in trucks from the shafts to the crushing plant; the haul distance from the Sneed Shaft is about one mi and from the Central Shaft, one quarter mi.

### Ore Search Continues

Prospecting is conducted by diamond drilling from the surface and from the underground openings. Also, some prospecting and exploration



Huebnerite mineralization occurs in quartz veins with sericitic schist walls

work by means of drifts, crosscuts and raises is continually being done.

The diamond drilling is conducted along the general strike of the shear zones, both within and beyond the limits of the mine as developed. The footwall and hanging wall areas of known ore bodies may be prospected as well as unproven sections between these known ore occurrences. When a drill hole encounters favorable mineralization, a number of additional holes are generally drilled to determine the size, location and attitude of the lens.

Holes drilled are EX in size and may vary up to 450 ft in length. The surface drill is powered by gasoline and the underground drill by compressed air. The diamond drill work is conducted by the company. An average footage slightly above 400 ft

of surface drilling and 1100 ft of underground drilling is done per month. The direct operating cost of the surface drilling is \$2.85 per ft and for the underground drilling, \$1.23 per ft.

The prospecting and exploration work conducted underground by drifts, crosscuts and raises, may be conducted on the level, from a stope or off of a raise. Such work may be directed along favorable looking structure, a narrow quartz vein or may be done to further explore areas previously diamond drilled. The work of prospecting, exploration and development often overlap.

Diamond drill core is carefully logged. A representative core sample for each five-ft section of the hole is retained. Core showing tungsten mineralization or vein quartz is split. Half is taken as a sample for assay and the other half kept as a permanent record. Also, core showing favorable geologic structure, is split for examination and kept for future reference.

The logs of all drill holes, including any assay results, are transferred to geologic maps. These data, along with those obtained by the detailed geologic mapping of practically all underground openings, are the basis for planning the prospecting and exploration work, and in many cases, for the direction of the development of individual ore lenses and in a broader sense, for the major development of the mine.

### Shaft Development

Both operating shafts are equipped with steel headframes with conventional built in skip dumps. The height of the headframe of Central Shaft is 71.5 ft and that of the Sneed Shaft 85 ft. Each headframe has a partitioned ore-waste bin of timber construction, with a capacity of 100 tons of ore and 75 tons of waste. The ore



Broken ore from silling out operations is loaded into two-ton cars

and waste are drawn from the bins into trucks. The gates of one bin are the undercut-guillotine type, air operated. At the other bin, the overcut-arc gates are hand operated.

The ground in which both shafts are sunk is generally good. Some blocky ground was encountered at the Sneed Shaft, and also, this shaft intersected a previously unknown lens of ore at the 1300-ft depth.

Both shafts are of the same size and of the same construction. Two hoisting compartments and a manway compartment of one-half size, are provided from the collar to the 850-ft depth. From there to the bottom, there are three and one-half compartments, the additional compartment being used for sinking. Outside timber dimensions for the larger section are 18 ft 5 in. by 6 ft 4 in.

Shaft timber is treated white oak. The sets are of 8 by 8-in. timber placed on six-ft centers. The sets are lagged through the major part of the shafts with two-in. timber. Bearer sets are placed at 200-ft intervals. The shaft guides are of 4-in. by 6-in. white oak.

Shaft stations are cut at the 200-ft level intervals. Ground support is not generally required. Ore and waste pockets with skip loading stations are provided at alternate level stations. Only a small waste pocket is provided at the intermediate levels. Ore from the intermediate levels is transferred through a raise to the ore pocket located on the next lower level. The ore and waste pockets and the ore transfer raises are provided with eight-in. spaced bar, inclined grizzlies. The skip loading stations have control gates with large throat openings for control of alternate ore and waste hoisting. Skip measuring pockets fitted with air operated, overcutting guillotine gates, are used for loading the skips.

### Shaft Sinking

The sinking of both shafts from the 900 level to the present bottom was by contract. Most of the work was conducted from the 900 level, working under a timber bulkhead. Upon the completion of the 900 level station and the waste pocket with skip loading station, the bulkhead was moved down below the waste pocket. This permitted service to the 900 level and waste pocket by the shaft hoist. The sinking bucket dumped through a chute into the waste pocket.

The sinking hoist at Central Shaft is a single drum hoist with post brakes, driven by a 75 hp motor with a solenoid brake. Rope speed is 290 fpm. The sinking buckets were of 20-cu ft capacity. Jackhammers of 62-lb weight were used in sinking. Bench rounds, across half the length of the shaft, were used with a cycle of drilling and mucking completed by each of the three shifts. The Riddell

Mucker was used for mucking. Timber was carried down with the sinking and not allowed to be over 50 ft from the bottom.

Levels and the skip loading stations were established from the shaft as sinking reached the respective locations. Only a minimum of excavation and timbering was done at this time but the work was left so as to permit ready completion at a later date. The 1500-ft level is the lowest level now established. At 1600 ft a spillage pocket is provided from which the shaft spillage is hoisted in one-ton cars.

### Level Development

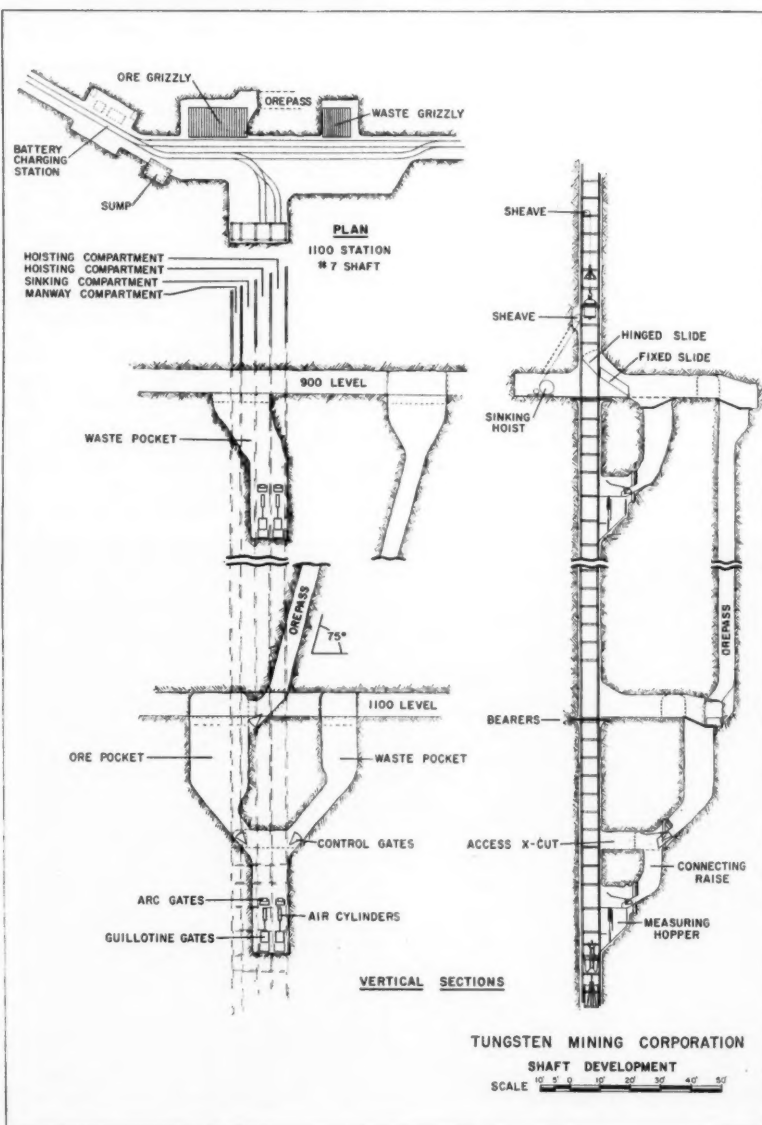
Lateral development of the mine is by levels from both shafts at 200-ft level intervals. Internal, intermediate sub-levels are developed as required. Crosscuts are driven from the two

shafts through the intervening country rock to the shear zone.

Earlier development, extending to the 300 level, was reached through small shafts sunk in the ore. From these levels were established 100-ft intervals.

At the Sneed Shaft, the crosscut to the main shear zone is 140 ft on the 500 level and increases in length with depth by the dip of the shear zone to the eastward. A second vein, as yet undeveloped, located some 500 ft in the footwall of the main shear zone will require crosscuts to be driven westward from the shaft on levels above the 1300.

The crosscut from the shaft may intersect an ore lens or only shear structure. Drifts are driven in both directions from the crosscut along the shear zone, developing the ore bodies





as encountered. Drift development southward from the Sneed Shaft extends a maximum distance of 1300 ft. The development northward from this shaft is continued to meet the corresponding level development from the Central Shaft. The two shafts are now inter-connected on two levels and will soon be joined on the third level.

At the Central Shaft, the crosscut to the main shear zone is 550 ft on the 500 level. This distance increases with depth. The development northward in the main shear zone extends a maximum of 900 ft. The distance along the main shear zone between the crosscuts from the two shafts is 3300 ft.

To develop the veins in the northwestern section of the mine, a crosscut is driven which successively intersects three different veins. The most westerly vein, relatively small in size, is located about 150 ft inside the schist area and is 750 ft from the shaft. The over-all length of the development of the veins of this second mineralized zone is 1800 ft.

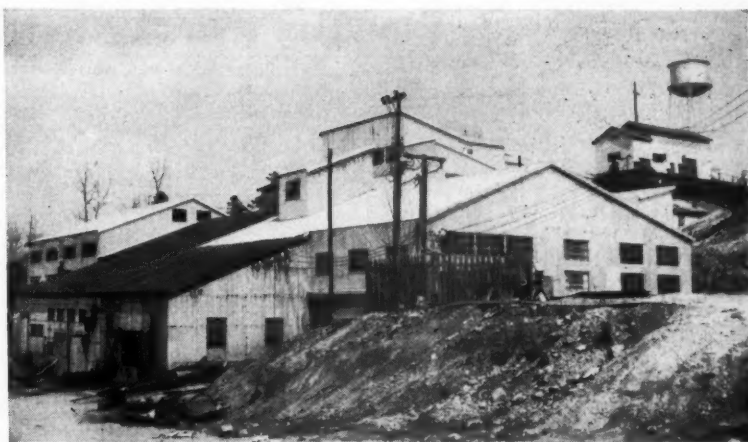
Drifts and crosscuts are six by eight ft and driven on a 0.25 percent gradient. Leyner type, automatic feed, three-in drilling machines are used for all lateral development. Tungsten carbide insert bits 1½-in. diam are used on threaded one-in. hexagonal steel for drilling. An Eimco 12-B loader is used for mucking.

### Stoping With Square Sets

The mining method is the square-set system with flat back. Some of the stopes are filled or partly so, others are not filled. The length of the stopes is 100 ft and they extend the full width of the vein. The smaller orebodies are mined as single stopes and vary in length. The stopes are mined through the 200-ft lift to the upper level, with complete extraction of ore.

Ore is generally strong, although where the quartz is fractured, some looseness in the stope back occurs. The walls of the vein are usually well defined and vary from strong to weak, with the weakness limited to the depth of the shearing and alteration of the wall rock. Sloughing of the walls, up to several feet deep may occur, depending on the degree of alteration. This sloughing is a source of ore dilution. Neither the ore nor the wall rock is heavy and shows no pressure.

The sill cut is started by breaking to the development drift which is driven along the footwall in ore. It is mined to the walls of the vein at drift height. The broken ore is then loaded out using Eimco loaders, with up to three tracks in the wider stopes to service the mucking operation. The back is then broken down over the full length of the stope to a height of 17 ft. Removal of this broken ore is then started and as soon as room is made,



Combined capacity of the two separate and equal circuits in crushing and milling plants is 800 tpd

the placing of sill timber is started. Leyners are used for drilling the first sill cut and stopers for drilling the back.

Sill timber, using nine-ft posts, is then placed the full length of the stope with ore chutes constructed on 20-ft centers. A floor of four by six-in. timber is laid on top of the sets, and grizzlies built over the top of the chute raises. A manway is provided at the end of each stope.

A horizontal cut is then taken full length of the stope above the sill timber using holes drilled vertically. Broken ore is hand mucked, or scraped by air slushers, into the chute raise. Breaking, mucking and timbering, are carried on concurrently in the stope, except in the smaller stopes, where each operation may be completed before the following work is started. Waste rock is hand sorted in the stope and disposed of there. When the back of the stope has reached about midway in its lift, one or more raises are driven to the upper level. These raises provide ventilation and are used for entry and service to the stope.

Square set timbers are oak. The sets are unframed, cap-butting and five by five-ft dimensions with eight-ft posts. The caps and the posts are of eight by eight-in. timber and the girts from four by six-in. stock. Caps 10 to 12 ft long are used to span two sets or to span the full width of the stope. Stulls are used when temporary support is required for the walls or back of the stope.

Waste hoisted to the surface and mill tailings have been used for stope fill, being passed to the stopes through openings to the surface. Whenever possible, waste rock from development work is disposed of underground in lower stopes and serves as fill.

### Mine Relatively Dry

The mine makes only 80 to 90 gpm of water. Pumping stations are located on the 900 level at both shafts

with sumps of 25,000-gal capacity. The pumping units are six-stage centrifugal pumps, of 100 gpm capacity, driven by 50 hp motors and operate with a positive suction head. Similar units will be installed on the 1500 level stations, operating with four of the six stages of the pump. When the 1700 level stations are developed, pumping stations the same as on the 900 level, will be duplicated there.

### Use Battery Locomotives

Ore is hauled by 1½-ton and 2½-ton storage battery locomotives in 28-cu ft side-dump cars. Some 18-cu ft end-dump cars are still in use. The track is 20-lb rail, laid on 24-in. gauge.

Nine locomotives are in use. They are serviced at battery charging stations at the shaft level stations. Tramping distances for ore haulage and for service to the development faces are relatively long.

Each shaft is equipped with a double cylindrical drum hoist, motor driven with full magnetic control, with double reduction gearing and of 12,000-lb. rope pull. They have Lilly controls and air operated post brakes and clutches, with the exception that the clutches on the Central Shaft are hydraulic operated. The rope speeds are 600 fpm. The hoists are operated in balance.

The hoisting rope is one-in. diam. A skip-cage unit is used in each hoisting compartment, the skip being of 50-cu ft capacity. At the Sneed Shaft, the skip is hung under the cage. At the Central Shaft, due to insufficient headframe room, the skip is placed over the cage.

### Crushing and Milling

The engineering and design work for an enlarged crushing and milling plant was started in January 1951. By the latter part of 1952, the new plant was completed.

The capacity of the plant is 800 tpd. The new plant, in addition to its in-

creased capacity, provides a flexible operation and effects a satisfactory metallurgical recovery over the several processes.

A new complete crushing section was built and has a capacity of 800 tons in 16 hours. The old crushing plant was retained for stand-by service. The expanded milling facilities were generally built around the existing mill with the construction work directed so as not to interfere with normal operation. Design of the completed plant provided for a two-unit mill, two identical and nearly complete milling circuits of equal capacity. In addition to the two independent mill circuits, a third, spare, grinding, screening and jig section is provided. The mineral dressing processes developed in the operation of the old mill were incorporated, essentially unchanged, in the new mill.

These processes include gravity concentration with sulfide flotation of all table concentrates to remove the sulfides. Final beneficiation of both the cleaned table concentrate and the jig concentrate is accomplished by high intensity magnetic separation. Secondary products from the magnetic separator operations are shipped and chemically treated to produce synthetic scheelite.

### Crush to Minus 1/2-In.

**Crusher:** The ore, hauled in trucks from the two mine shafts, is delivered to the crusher ore bin which has a capacity of 150 tons. It passes through a 12-in. inclined bar grizzly. At the top of the ore bin, bank storage up to 1000 tons, is provided. From this storage the ore, if required, is bulldozed into the bins.

In the crushing plant the ore is reduced in two stages to minus 1/2-in.



Ore is dumped over eight-in. inclined grizzlies into shaft pockets

### MINE COSTS IN UNITS OF LABOR

Monthly tonnage mined—25,336 tons—Waste Hoisted—5147 tons

Development Footage:

Drifts and crosscuts.....	1219 ft
Raises .....	337 ft
Winzes .....	69 ft
<b>Total .....</b>	<b>1625 ft</b>

Labor (Man hours per ton ore mined)

Development:

	Drifts and Crosscuts	Raises	Winzes
Breaking .....	.153	.055	.012
Timbering .....	.003	.029	.018
Mucking .....	.123	.006	.014
<b>Total .....</b>	<b>.279</b>	<b>.090</b>	<b>.044 — 0.413</b>

Stopping:

Breaking .....	.303
Timbering .....	.963
Mucking .....	.655 — 1.921

Indirect Costs:

Tramming .....	.305
Hauling Timber—U.G. ....	.160
Hoisting .....	.149
Mine Maintenance .....	.172
Pipe—Track .....	.071
Ventilation .....	.021
Stope Fill .....	.003
Supervision .....	.132
Mechanical—Electrical Service .....	.047
Timber Framing—Mine Surf. Maint. ....	.019
* Surface Transport .....	.021 — 1.100

**Total Labor Cost—Chargeable to Mine .....** **3.434**

Average tons per man shift—underground..... 2.390 tons

Average tons per man shift—surface labor chargeable to mine..... 91.954 tons

Average tons per man shift—total labor chargeable to mine..... 2.330 tons

Average tons per stoping machine drill shift..... 26.86 tons

	Drifts	Raises	Winzes
Ave. footage per machine drill shift (two months) feet.....	4.32	3.31	1.76

\* Does not include surface transport of ore and waste.

screen product. This is the mill feed and is delivered to a 600-ton ore bin. The two crushing units are a jaw crusher and a Symons shorthead cone crusher. A 300-ton surge bin is pro-

vided between the circuits of the two crushing units. An 18,000 cfm bag-type dust collecting system is installed. The collected dust is fed back into the mill circuit.

Mill feed first passes over a weightometer and then a mill head sample is cut and fed through the mill sample plant. The mill feed is then split equally and delivered to the two circuits. Both splits later join in the slime section, as one circuit.

### Sand Section

The 1/2-in. mill feed is delivered to a 1/2-in. screen. The oversize goes to an end peripheral discharge rod mill and the undersize goes directly to the jigs. From the jigs the pulp is fed to 0.07-in. screen, with the oversize going to the rod mill and the undersize to a rake classifier. The discharge of the rod mill is in closed circuit with the 1/2-in. screen.

Sand product from the rake classifier is fed to an eight-spigot hydraulic classifier, from this the classified sands are fed to eight Deister sand tables. All of the eight tables produce a concentrate and a middling. A tailing is made by all tables excepting the No. 1 table. The No. 1

(Continued on page 132)

# TACONITE...

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SYMONS  
VIBRATING GRIZZLIES  
and SCREENS



DIESEL  
ENGINES

View shows two of several 7' Symons Super Heavy Duty Short Head Cone Crushers installed in the Lake Superior region.



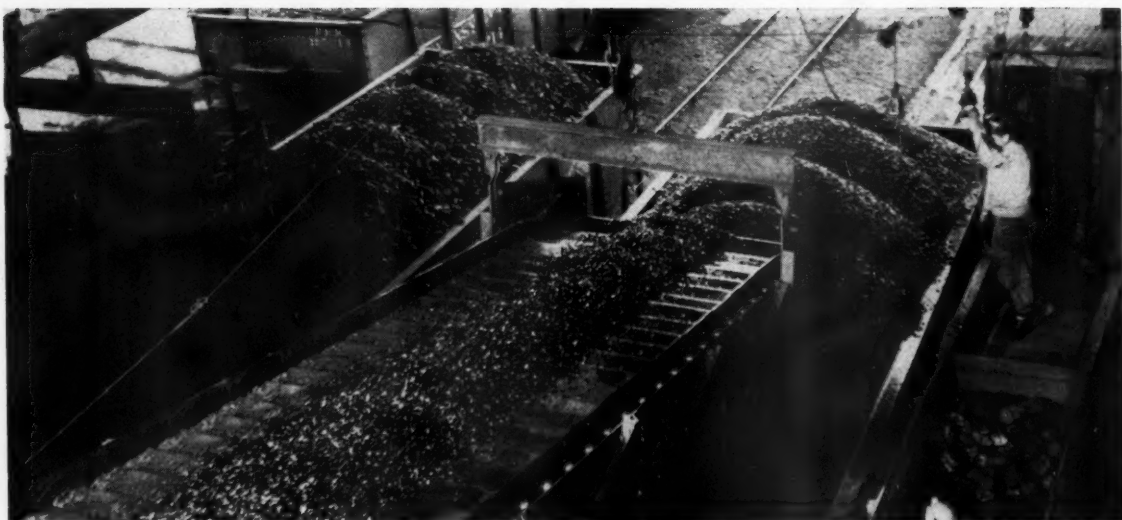
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Continuous mining introduces a demand for greater cleaning facilities to prepare a high quality product

# Preparation Problems of Continuous Mining

**A Compilation of Data on Conventional and Continuous Mining, Reflecting the Viewpoints of a Coal Operator, a Manufacturer of Coal Cleaning Equipment and a Manufacturer of Continuous Mining Machines**

**By F. P. CALHOUN**  
Subcommittee Chairman

THE problem of preparing coal produced by continuous mining that is common to practically all coal fields and most seams is caused by the increased amount of fine coal in the continuous product as compared to the amounts obtained by conventional methods of cutting, blasting and mechanical loading. Other problems not so universal but equally important in some instances, are caused by increased impurities and greater moisture. These problems are discussed in this report in an attempt to show how they affect operation in cleaning plants already in existence and how they must be met in the design of new plants.

Due to the great number of variables encountered in coal mining, it is impossible to predict with accuracy the changes that will take place in the characteristics of the mined product if a change is made from conventional to continuous methods. No set of rules can be written that will hold

true in all cases. Differences in seam characteristics (thickness, friability, inherent inert materials, and cleavage pattern); blasting techniques used; the amount of degradation in transport from face to washer; roof and bottom conditions; the mining system employed, and perhaps other factors all affect the washer feed and produce different cleaning results.

## Size Consist Is Affected

It is generally agreed that the greatest size degradation due to continuous mining occurs in the firmer structure, tough coals. The more friable the coal, the less change in size consist. Another factor that influences the size consist is pressure on the coal. Where pillars are extracted, there will be more coarse coal. Since there is a wide variation in screen analyses from mines operating in the same seam, the data given in the various tables do not hold for all mines in that seam, but do give typi-

The report submitted here was presented by the Committee on Coal Preparation at the Annual Conference of the Coal Division in Pittsburgh on November 13, 1953. Since then, other types of machines that have come into use may solve some of the earlier problems and perhaps introduce some new factors. The committee is starting another report which will be based on these later operations.

cal cases of what did occur in certain mines.

It is true that in some instances size consist can be helped by special speed, chain lacing or cutter head arrangement. Manufacturers of continuous mining equipment predict that in the future there will be a significant improvement in size consist due to research presently being done. They do suggest, however, that preparation plant design be based on present performance of the equipment. This suggestion means that closed circuits will be more expensive—note the increase in minus 100 mesh shown in Tables I through IV.

It is generally agreed that the power required to operate a continuous machine varies with the amount of fines produced. Considerable work and experimenting has been done by machine manufacturers and coal oper-

ators on different type cutter heads and bit arrangement on cutting chains.

The following tables show screening data submitted from companies operating continuous mining in several seams and states. Table I shows comparative screen analysis of conventional and continuous mining in the Miller "B" Seam in Pennsylvania. Table II compares conventional and continuous mining in the Upper Freeport Seam in Pennsylvania. In this case, two makes of continuous machines were operated in same mine. Table III compares conventional and continuous mining in Alabama. Table IV compares conventional and continuous mining in the Pittsburgh Seam in Marion Co., W. Va. Table V and VI show typical screen analysis of continuous-mined coal in Illinois and Colorado.

## Impurities Increased

It is generally true that continuous mined coal contains more extraneous impurities from roof and bottom, than coal from conventional mining because it is difficult to control cutting into the top and floor. The following statement on this subject was made by a representative of a continuous mining machine manufacturing company:

"The ash content of coal mined by continuous mining methods is another factor which is variable, depending on seam conditions. It is obvious that the best possible ash content would be that developed by a channel sample. Rarely, however, can this situation be duplicated under continuous mining methods. The worst situation occurs in low seams where the operator constantly tends to increase the height of the room by taking top,

TABLE I: MILLER B SEAM IN PENNSYLVANIA—TWO MINES

MINE A Size	Conventional Mining Cum. Wgt. Thru	Continuous Mining Cum. Wgt. Thru	% Increase Cum. Wgt. Thru
2 1/4 in. ....	74.55%	93.66%	19.11%
3/4 in. ....	61.89	73.30	11.41
1/4 in. ....	43.44	52.07	8.63

MINE B Size	Conventional Mining Cum. Wgt. Thru	Continuous Mining Cum. Wgt. Thru	% Increase Cum. Wgt. Thru
2 in. ....	90.90%	91.96%	1.06%
1 in. ....	80.71	83.98	3.27
3/4 in. ....	74.13	78.98	4.85
1/2 in. ....	48.00	57.60	9.60
1/4 in. ....	36.91	47.16	10.25
1/16 in. ....	22.60	30.34	7.74

TABLE II: FREEPORT SEAM IN PENNSYLVANIA—TWO TYPES OF CONTINUOUS MACHINES

Size	Conventional Mining Cum. Wgt. Thru	Continuous Machine A Cum. Wgt. Thru	Increase Cum. Wgt. Thru	Continuous Machine B Cum. Wgt. Thru	Increase Cum. Wgt. Thru
2 in. ....	87.4%	93.5%	6.1%	91.3%	3.9%
1 in. ....	73.0	83.7	10.7	77.0	4.0
3/4 in. ....	43.8	52.1	8.3	49.0	5.2
1/2 in. ....	28.7	36.2	7.5	34.8	6.1
1/4 in. ....	19.5	25.9	6.4	26.1	6.6
100 M ....	2.9	4.8	1.9	5.2	2.3

TABLE III: CONVENTIONAL AND CONTINUOUS MINING IN ALABAMA

Size	Conventional Mining Cum. Wgt. Thru	Continuous Mining Cum. Wgt. Thru	% Increase Cum. Wgt. Thru
6 in. ....	93.47%	96.32%	2.85%
3 in. ....	83.28	90.96	7.68
1 1/2 in. ....	66.44	80.77	14.33
3/4 in. ....	43.12	60.68	17.56
1/2 in. ....	35.00	50.42	15.42
3/8 in. ....	24.27	35.17	10.90
8 M ....	12.40	19.27	6.87
100 M ....	.78	2.05	1.27

TABLE IV: PITTSBURGH SEAM IN MARION COUNTY, W. VA.

Size	Conventional Mining Cum. Wgt. Thru	Continuous Mining Cum. Wgt. Thru	% Increase Cum. Wgt. Thru
5 x 2 in. ....	90.8%	95.7%	4.9%
2 x 1 in. ....	67.9	82.6	14.7
1 x 3/4 in. ....	49.0	67.4	18.4
5/8 x 10 M ....	36.5	50.8	14.3
10 x 28 M ....	16.2	25.1	8.9
28 x 100 M ....	10.2	17.2	7.0
-100 M ....	2.5	4.3	1.8

TABLE V: NO. 5 SEAM IN ILLINOIS

Size	Continuous Mining Cum. Wgt. Thru
6 in. ....	99.7%
3 in. ....	96.0
2 in. ....	91.3
1 1/2 in. ....	87.1
1 in. ....	80.5
3/4 in. ....	69.4
5/16 in. ....	43.2
10 M ....	21.0
28 M ....	11.7
48 M ....	7.6

TABLE VI: BAUM MINE IN COLORADO

Size	Continuous Mining Cum. Wgt. Thru
2 in. ....	82.0%
1 in. ....	67.0
3/4 in. ....	39.0
1/2 in. ....	29.0
1/4 in. ....	19.0
1/16 in. ....	11.5
28 M ....	7.1
48 M ....	4.1
100 M ....	2.3
200 M ....	1.1

bottom, or both. In other seams the operator may mine at the top or bottom due to accident or carelessness.

Considerable work has been done with respect to automatic controls or visible controls which would notify the operator or prevent him from mining in the top or bottom. Technically, these controls have been developed. In general, most of them involve considerable gadgetry and operating reliability is not as good as might be desired.

In addition, the point of view of the operator is super-imposed on the machine. While the president of the coal mine or the preparation manager—not to mention the customer who buys the coal—may be greatly interested in the ash content of the coal as mined, that interest seems to decrease steadily down through the organization to the machine operator. He frankly has very little interest in quality control. If there is any inconvenience or effort involved in top and bottom limit controls, the operator has a strong tendency to ignore them completely. It is likely that this situation will continue to exist.

"It could be said from an examination of the results obtained by various manufacturing companies, who have spent considerable energy in this direction, that all efforts have been relatively unsuccessful when finally subjected to the acid test of the operator and what he does to the machines and its controls after he gets it."

Continuous mining machines using high speed cutting heads or chains require the use of sufficient water in spray form to allay the dust gener-

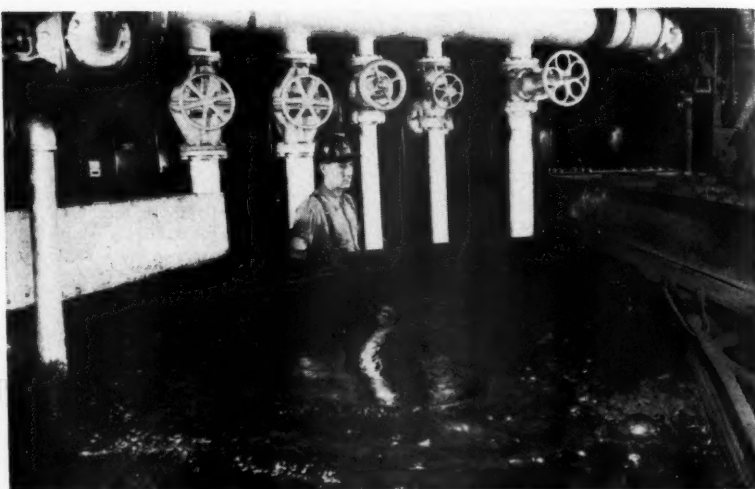
ated. This water has the effect of increasing the moisture in the finer sizes. This increase is said to be one percent or more, depending on design of spray system and supervision of its use. It is argued that, even if a dry system of dust collection is developed for the miner, State and Federal regulations of dust allaying at transfer points will require an amount of water comparable to that now used at the face.

### Effect on Conventional Preparation Methods

**Sizing:** In general, the increase in fines fed to the cleaning plant decreases the capacity of the plant. Most plants are designed to screen the coal at  $\frac{3}{8}$ -in. or  $\frac{1}{4}$ -in. and clean the sizes separately. With an increase of 20 to 30 percent in the amount of fine coal, the mine run feed must be decreased proportionately or cleaning efficiency will fall off. The same applies to plants with fine coal drying facilities, and water clarification systems. Capacity can be maintained by adding cleaning and drying units to the cleaning plant. Of course, this results in increased costs—capital, maintenance and in some instances, operating labor.

Plants designed to wet clean the entire product usually encounter trouble in the water-clarifying circuit with an increased amount of extreme fines fed to the plant. The amount of minus 200 mesh will increase from 50 to 75 percent in the continuous mined product. As a result, more solids are pumped to the silt pond until additional water-clarifying equipment can be installed.

**Additional Impurities:** Because continuous mining often follows full seam mining, the additional impurities do not usually reduce plant capacity. However, since the additional foreign material usually comes from above or below the coal seam, it may cause trouble in the water clarification equipment and result in inefficient



As size of raw coal feed decreases, greater strain is put on cleaning plants equipped to treat conventionally mined coal

cleaning, particularly of fine sizes.

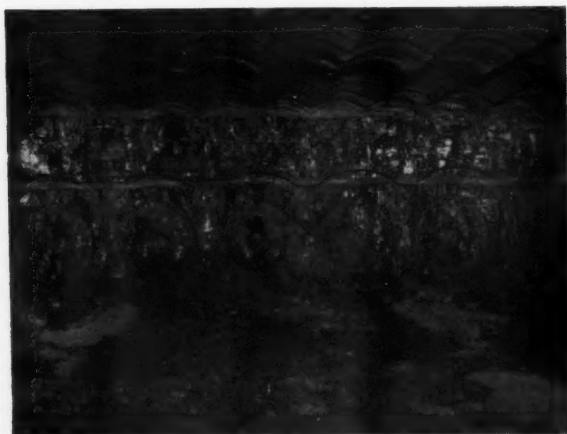
**Moisture:** The addition of one percent or more free water to the raw feed to screening plants decreases capacity, or lowers screening efficiency if capacity is maintained. This is true of dry screening only. In wet screening, the additional moisture of the coal feed aids in completely wetting the fine coal and actually increases screening efficiency. In air cleaning plants, on fine coal, the increased moisture may make pre-drying necessary to maintain reasonable cleaning efficiency.

### Continuous Mining Affects Cleaning Plant Design

Designers of cleaning plants require reliable data such as screen analyses and multi-gravity float-sink tests on the raw coal to design a plant. Results from mines in similar seams are not usually accepted as being representative of continuous mining in the mine for which the plant is being designed. This means that a continuous miner should be used in the

mine for a sufficient time to get the necessary design data. During the waiting period of about 18 months, until the plant is ready for operation, there may be changes in machines and mining systems that make the design data obsolete. It is better to use data from machines operating under similar conditions and make plenty of allowance for variation in size consist, amount and type of impurities, and moisture content.

Continuous mined coal is generally finer, higher in ash and may contain more moisture than coal mined by conventional cutting, shooting and mechanical loading. The effect on cleaning plants designed for conventional mining is to reduce capacity, or lower efficiency. The effect on design of new cleaning plants is to increase the cost due to the necessity of providing extra capacity for possible future variations in size consist. Comprehensive studies are good insurance and should be made before spending additional capital on existing plants or installing a new one.



Both boring and ripper type machines mine the full seam and generally introduce a change in raw coal feed characteristics





Contact should be established early between industry and the mining engineers, geologists and metallurgists of the future

## Recruiting Mineral Industry Personnel

**Reach the High Schools, Seek Favorable Publicity and  
Increase Aid to Students as a Means of Overcoming  
Engineering Manpower Shortage**

A SHORTAGE of experienced and trained manpower has plagued the mineral industries for a number of years. The mines in particular have been unable to find experienced men. While technical staffs have been short-handed in all engineering industries, this has been especially so in the mineral field. Even now, nine years after the close of World War II, there is an acute shortage of metallurgical and ceramic engineers and mine operators still complain of the lack of skilled labor.

Competition for men is intense. Large construction jobs with good pay rates and opportunity for overtime work have attracted men from all industries. The rise of the aircraft industry and the great expansion of the automotive industry, in both its service and manufacturing aspects has provided employment for a large part of the available manpower. In comparison to mining, work in many of these industries is more attractive. Living conditions are frequently better, much of the work is in urban localities attractive to the family man,

By **DRURY A. PIFER**

Director  
School of Mineral Engineering  
University of Washington

and in recent years the employment has been of a permanent nature.

During the past 50 years the mineral industries have attained a mature position in the industrial economy. With maturity has come a loss in glamour which has passed to those industries which are achieving initial spectacular successes. When new mines were being discovered and fortunes made and lost, the opportunity attracted men. The same motivation is now accorded the aircraft industries, the atomic energy program, and the petroleum exploration field.

### Lack of Contact

There is a notable lack of contact between the public and the mineral industries. Mines are characteristically located in remote areas off the

main highways, while metallurgical works are concentrated in a few areas with only the local people fully acquainted with the size and importance of the industry. The large ceramic industry is, in the public mind, associated with its art aspects, while the important work of the geologist in discovering mineral deposits is virtually unknown. The man on the street has almost no knowledge of the important part the mineral industries play in his daily life and knows nothing of the size of the industry, its technical advancements, nor its manpower requirement.

With the general public so poorly aware of the mineral industries it is no wonder that the young people now in the high schools are also completely unaware of the opportunities in those occupations. If these students are to be brought into the industry, on any level, they must first learn that there is opportunity for them equal to that offered by any other segment of the industrial economy.

There is almost no realistic contact between high school students and the

industry. In classes in economics the student is taught that the source of basic raw materials is agriculture, forestry, fishing, and mining. Then attention quickly turns to goods, services, and the social aspects with no regard for particular fundamental sources of wealth. In chemistry classes a good part of the textbook deals with metallurgical processes which are studied as applications of chemical phenomena, but the industry as an opportunity for a career appears to have escaped the notice of most instructors and students. In physics classes the emphasis for future employment appears to be centered on the opportunities in atomic energy rather than the less publicized branches of engineering though they, too, are a necessary part of the atomic energy program.

### A "Bad" Press

The public press gives little notice to the mineral industries excepting the unfavorable aspects. The publicity given to a loss of life by an unfortunate mine worker ordinarily seems considerably greater than that given to the same unfortunate accident in any other industry. If several men are involved in an underground disaster, often the world press takes notice. In the negotiation for new labor contracts the unfavorable aspects of employment are given prominence and repeated in the news releases. In spite of the best efforts of the S. E. C. and the state "Blue Sky" laws, securities in poorly conceived mining ventures continue to be offered. The resulting losses leave a poor impression.

Sons and daughters of employees should offer a fertile group from which to recruit personnel. Unfortunately, too many employees do not wish to see



As the industry matured, mining lost a lot of its glamour

their sons enter the industry, and many of the young people have no desire to do so. The reasons for this attitude are many, but a failure in company personnel policies is probably a major cause.

### Sales Program Needed

Having briefly reviewed some of the factors which contribute to present manpower difficulties, attention may be turned to means of correcting them. It is obvious that if the foregoing attitudes are to be changed it will be a long term and continuing job. No short program will suffice to correct public impression and develop a generally favorable attitude. The industry has something to sell in the forms of opportunity, fascinating careers, important work, and personal satisfaction in achievement. All the techniques of modern salesmanship need to be brought to bear if worthwhile progress is to be made. Such a

program must be generally widespread, it must be of a continuing nature, and ideally should be aimed in large part toward that segment of the public whose attention is desired.

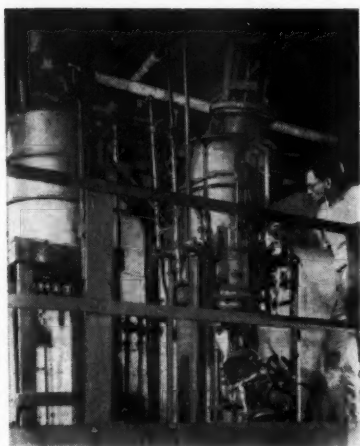
There are some excellent examples of public relation techniques which could be, with advantage, more generally adopted. The annual reports of a number of large companies are emphasizing company-employee relations. This, without doubt, is creating a favorable attitude by stockholders toward particular companies. The same type of information is disseminated among employees. When this is accompanied by deed as well as word, favorable attitudes are developed. The employees of a company should provide its greatest reservoir of potential manpower; however, only by the most careful attention to the human aspects of employment, comparable to that given to the technical development, will such a reservoir become fully available. The detailed techniques of creating such attitudes are well known. It remains for management to vigorously put them into operation, and though it will be costly, the value to be retrieved from the investment is worthwhile.

### Reach the High School

The next manpower reservoir of major interest is the high school population. Any program aimed at these students must be continuous and vigorous to keep pace with the turnover. In this connection, the high school advisors, librarians, and science teachers offer a stable continuous contact. The cooperation of these teachers is essential if any progress is to be made. In personal contacts with high school teachers the writer has found that they are anxious for vocational guidance material, and there is altogether too little of it in the engineering and science areas. A recognition of this need is the key to a basic contact with the high school, and influential members of the faculty must be supplied with materials and appraised of reference sources. Such information is ordinarily buried in the technical press and is unavailable to high school faculties. The kind of information they need consists of brochures describing the work done in the various industries, the opportunities for employment, the preparation necessary and where it can be obtained; education costs; salary ranges and averages. Practical information on how to go about finding a job is also necessary. The teachers need to know where suitable industrial films can be obtained. They also need lists of reference material which is judged suitable for vocational instruction. These materials must be in such form that librarians can incorporate them into their reference systems. Many books written for high school students offering general vocational guidance information are sadly deficient and



A program of summer work for students would decrease the number who are forced to leave school because of a lack of funds



Public attention should be focused on the new frontiers being pushed back by the mineral industries

often incorrect when discussing engineering and particularly so when covering the mineral industries.

The mineral industries must provide their own vocational guidance booklets. Some are now becoming available. Books on a regional basis may be more effective than those written from a general professional or national viewpoint, and students will feel that such local information is of personal and direct value. Science clubs in high schools and occasionally the high school science teachers are interested in having men from industry give short talks. Local technical societies can provide such a service. In Seattle, both the local chapter of the AIME and the Puget Sound Engineering Council have such a program. Industrial motion pictures are worthwhile, but most of them are too technical and do not show the kinds of work which appeal to students. Those which emphasize technical aspects do not bring students' attention to the work of the man behind the scene. Motion pictures available on a cost-free basis stressing vocational aspects would find ready acceptance in the high schools. Such pictures would have to be kept up to date to maintain interest in repeated showings by high school faculties. To be effective they would have to be shown in many high schools year after year. This requires that a number of copies be available at regional centers throughout the country. Many universities' film library service afford such a distribution.

In some communities the possibility of offering more work in the high schools about the earth sciences and their economic aspects could be explored with the high school faculty. Teachers would need exhibit materials as well as textbook sources to make such instruction effective. To this end at the University of Washington several sets of economic minerals have

been prepared for circulation among high school and grade school teachers. A chart with the set shows the principal metal content, the localities from which the major metallic production is obtained, and the location of mines within the state.

In the past year the author has had the opportunity of visiting and talking with a large number of the graduating high school students in the state of Washington who are planning to enter engineering. Among them there was almost a complete lack of knowledge of the mineral industries not to mention a number of downright misconceptions. Very few had any intention of working in any branch of the industry or even considering it as a potential source for employment. It is not the fault of the students that they are not informed; they are eager to learn. It is the business of industry to provide the information for them.

### Offer More Scholarships

Industry has offered little specific encouragement to high school students to take advanced studies in the universities. A survey of the mineral industries' scholarships available to high school students in the United States last year emphasizes this point. Replies received from 33 major schools show that they have but 126 mineral industry scholarships available for entering freshmen. Of these, there are 12 in metallurgical engineering, only one in geological engineering, 30 for students in ceramic engineering, 38 for those interested in metal mining, and 35 for those in coal mining. The number of industry and trade-organization sponsored scholarships available to undergraduate students in all of the four years totals 197. These being distributed 51 to

mining, 118 to metallurgy (a large number being from the Foundry Education Foundation), 13 to petroleum, 8 to ceramics, and 9 to geology. Do these figures represent the true interest of industry in its future supply of engineers? Scholarships offered in the high schools attract the better students into the industry and advertise the idea that the industry wants good men and is willing to pay for them. This is a very direct approach to the problem and can be made directly beneficial to the sponsors, since scholarships giving employees' families preference and offering summer employment to the holders will both create good will and also recruit superior men for the sponsor's staff.

### Seek Favorable Publicity

The major impact of the mineral industries on the general public is through the daily press, popular magazine articles and through advertisements by major metal producers and fabricators. It is not common for engineers or raw material producers to seek publicity. Enlightened self-interest dictates that such publicity should be sought. Most newspaper editors are anxious to obtain information about new developments or personalities. A disaster story gains space in the press; a success story would also receive publicity if it were made known. It does not take a press agent. Any alert person in the organization can be assigned the responsibility of calling the attention of the local newspapers to those things which would bring favorable notice to a company. In aggregate, this could amount to much good will. A more subtle approach is with the services of advertising agencies to

(Continued on page 126)



Scholarships for miners' sons should help tap this major source of badly needed engineering manpower



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## High Grade Concentrate

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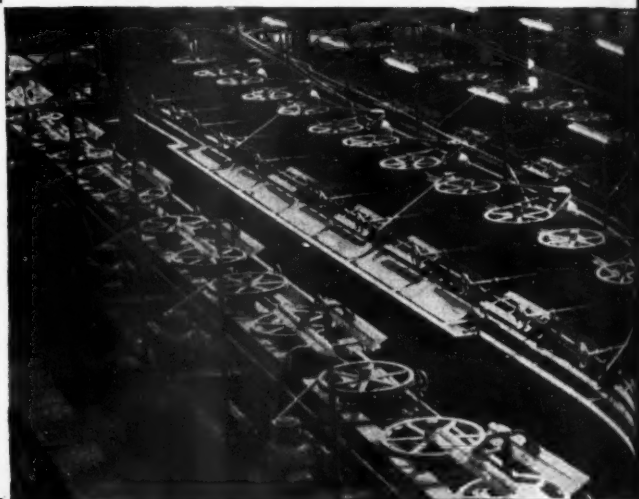
**DENVER "SUB-A'S" RECOVERING LEAD AND ZINC:** Denver "Sub-A" Flotation Cells in large Australian lead-zinc mill. Lead rougher flotation is accomplished in a 12-cell No. 30 (56x56) Denver "Sub-A" and cleaning is done in a 10-cell No. 24 (43x43) Denver "Sub-A." Zinc flotation is performed with identical units.



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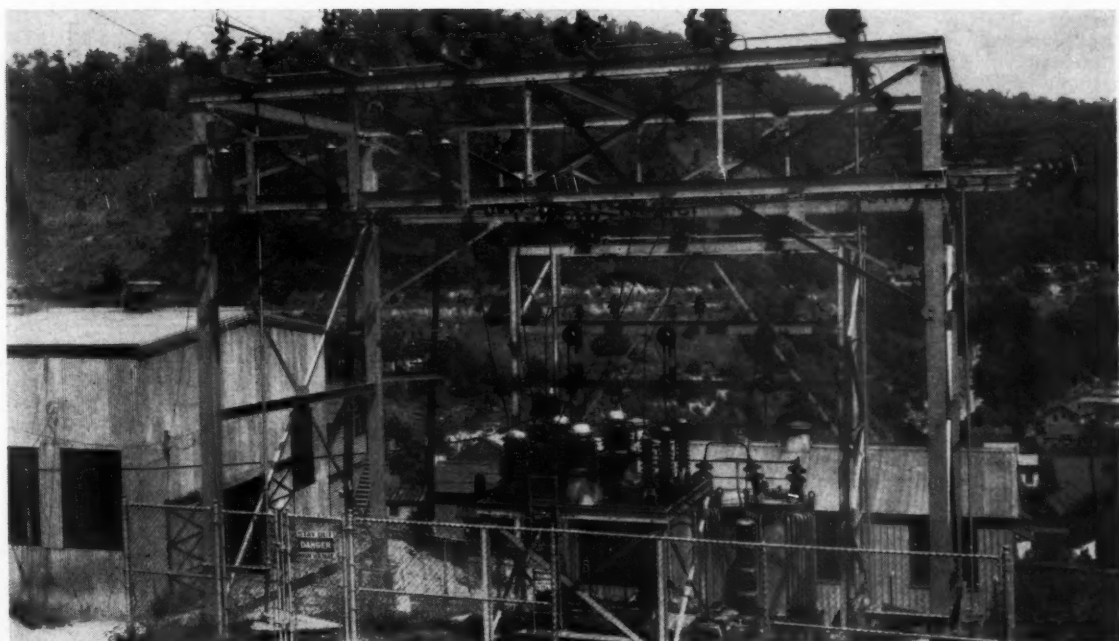
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The use of electricity has brought the United States mining industry to the position of world leader in mining efficiency

# Electrical Problems Arising from Federal Safety Regulations

**Question and Answer Forum Explains Away Much of Confusion Caused by Electrical Provisions of Public Law 552**

**By M. J. ANKENY**

*Safety Director  
Bituminous Coal Operators' Association*

THE high efficiency of American coal mining methods, in contrast to those in other coal producing countries of the world, is attained through the use of electrical energy as a source of power for mining operations. The coal mining industry of this country is indeed dependent on the high degree of mechanization made possible by electricity; moreover, the future of the industry depends upon further exploitation of electrically powered machines to reduce production costs.

In Europe the productivity of the coal miner is much lower than in the United States because the use of electrical energy underground as a

source of power was greatly retarded by laws and mining regulations. It was believed that the gas ignition hazards incident to the use of electricity were too difficult to control. Until recent years the use of electrical power underground, except for very limited application, was forbidden in European countries. Even in America, fear of electrical ignition hazards prevailed in the early days of coal mining hence widespread use of compressed air as a means of power transmission.

## **Fight Basic Ignition Causes**

The history of the coal mining industry in America is replete with instances in which coal mine explosion disasters and fires have been attributed to electric arcs and sparks.

Since it has been known for a long time that arcs and sparks of electrical origin have ignited many gas and dust explosions, one may well wonder why greater progress toward the prevention of these disasters has not been made until recent years. Do not the circumstances under which these accidents have occurred suggest that too much emphasis has been placed upon ignition sources to the exclusion of the basic causes, that is, the inadequacy of the ventilating system or the inadequacy of the methods intended to meet the dust explosion hazard?

Use of permissible machinery, at best, can only be considered a secondary line of defense against gas ignitions. The primary defense against gas ignitions always has been and will continue to be an adequate ventilating system plus eternal vigilance to see that explosive gas is not present in any place where it could be ignited.

Most of the electrical problems arising out of Public Law 552 and the Federal Mine Safety Code revolve around Section 209(f) (1) of the Act pertaining to permissible electric face equipment and Article VIII, Section 5b of the Code pertaining to the grounding or equivalent protection of metallic frames, casings, and other

Based on a paper presented to the Joint Meeting of the Central Appalachian Section, AIME, and the West Virginia Coal Mining Institute, May 15, 1954.

enclosures of electric equipment that can become "alive" through failure of insulation or by contact with energized parts.

The Underwriters Laboratories, sponsored by the National Board of Fire Underwriters, for many years has had a program of testing motors and other electrical equipment designed for safe operation in hazardous locations. The use of equipment approved for operation in hazardous locations by the Underwriters Laboratories is not mandatory but its use, where desirable, results in substantially reduced insurance rates in industrial plants.

### Permissibility, What It Means

The Federal Bureau of Mines' system of testing electrical equipment for permissibility is the counterpart for the coal mining industry of the Underwriters Laboratories' system for industrial applications. The system varies from the Underwriters' system in that it was not conceived with the idea that permissibility would become a factor in determining insurance rates nor was there any thought when the system was put into effect that the use of permissible equipment would be made mandatory by Federal law. It may be correctly stated that the primary purpose of the permissibility system was to protect the industry against the purchase of equipment erroneously claimed safe. Undoubtedly, permissibility has contributed to the development of the rugged, high quality, safe equipment in use in mines today. The standards by which the Bureau inspects and tests electrical equipment for permissibility are known as Schedule 2E, issued in its amended form in May, 1952, under the title, "Procedure for Testing Junction Boxes and Electric Motor-Driven Mine Equipment for Permissibility."

Another important way in which the Bureau's permissibility system varies from the U. L. system is that while the Underwriters approve motors, switches, and lighting fixtures as individual units, the Bureau will grant approvals for complete machines only. They will not grant such approvals for motors, controllers, rheostats, cables, or other individual parts used in the assembly of machines or appliances.

The testing and approval of electric face equipment by the Bureau of Mines was authorized by an Act of Congress in 1913 under conditions that were vastly different from those of the present day. When the idea of permissible equipment was first conceived, the only electric machines used at the face were electric coal cutters and coal drills. No one had any idea of the many types of face equipment that would come into use with the ad-

vent of complete coal mine mechanization; nor of the complications that would arise with field alterations of equipment and the development of new machines. The provision in Public Law 552, which made the use of permissible electric equipment mandatory in gassy mines, has introduced serious administrative problems for the Bureau of Mines. It will continue to introduce serious difficulties for the industry until some of the questions it raises are finally answered.

### Law's Application Limited

It is well at this point to consider the word "permissible". It is defined in Public Law 552 as follows:

"Sec. 201. (a) (9) The term 'permissible', as applied to equipment

device approved by the Director which indicates that such equipment conforms to such specifications, and (3) authorizing such manufacturer to attach an identical approval plate, label, or other device to all identical equipment."

It is thus apparent that it is the intent of the law to limit the specifications prescribed by the Director to those which are designed to assure that such equipment will not cause a mine explosion or mine fire. It can be safely assumed, in my opinion, that any specifications in Schedule 2E, or any other regulations promulgated by the Bureau of Mines not designed to assure that the equipment will not cause a mine explosion or mine fire, are unenforceable under the Federal Coal Mine Safety Act.



When the idea of permissible equipment was born, cutting machines and drills were the only pieces of electrical equipment at the face

used in the operation of a mine, means equipment to which an approval plate, label, or other device is attached as authorized by the Director under section 212 (a), and which meets specifications which (A) are prescribed by the Director for the construction and maintenance of such equipment, and (B) are designed to assure that such equipment will not cause a mine explosion or mine fire."

Section 212 (a) referred to in the foregoing states:

"Whenever the Director determines that the construction of any equipment conforms to specifications prescribed by the Director which are designed to assure that such equipment will not cause a mine explosion or mine fire, he shall issue a certificate to the manufacturer of such equipment (1) stating that such equipment has met such specifications, (2) authorizing such manufacturer to attach an approval plate, label, or other

Section 209(f) (1) of the Act provides that all electric face equipment used in a gassy mine shall be permissible equipment. However, several important exceptions to this requirement have been written into this provision. These exceptions are as follows:

(1) Electric face equipment may be nonpermissible if such equipment was owned by the operator before the effective date of the law—July 16, 1952.

(2) Electric face equipment may be nonpermissible if such equipment was owned by the operator at the time the mine became a gassy mine under the Act.

(3) Electric face equipment may be nonpermissible if such equipment was ordered by the operator before the effective date of the law—July 16, 1952.

It is possible, therefore, and perfectly legal, for an operator to transfer nonpermissible electric face equipment from a mine, whether or not it



is a gassy mine, to a gassy mine provided that he owned such equipment or owned the right to use such equipment prior to the effective date of the Act, July 16, 1952, or the date which the mine became gassy, whichever is later. This right of the operator to transfer nonpermissible electric face equipment is abridged, however, by a further proviso which says that permissible electric face equipment in use in a gassy mine shall not be replaced by electric face equipment which is not permissible. For example, if an operator had four permissible mining machines in a gassy mine on the effective date of the Act, he cannot take one of those machines out of service and replace it with a nonpermissible machine. If, however, he desires to increase the number of mining machines at the mine, and he owns a nonpermissible machine at another mine which he purchased prior to the ef-

fections in working places or other places where dangerous quantities of methane may be present or may enter the air current. Some relief is provided in the concluding sentence of this paragraph which provides that where nonpermissible junction or distribution boxes are in use or on order on the effective date of the Act, or the date such mine became a gassy mine, whichever is later, the use of these boxes may be continued until such time as replacements are made. Peculiar wording in this provision leaves it almost entirely up to the inspector to determine in new installations where open-type power connections may be made and where permissible junction boxes may be used. Any operator planning a new electrical layout had better find out (1) what is meant by a multiple-power connection; (2) does "working places" mean in any room or entry or does it mean

permissible equipment in gassy coal mines. *The installation of any newly purchased nonpermissible electric face equipment in a gassy mine is clearly prohibited by law.*

As a result of these provisions of the Federal law, for many years to come many mines will be equipped with mixed equipment. In other words, some of the electric face equipment in a mine will be permissible while other equipment will be nonpermissible. Machinery permissible on the effective date of the Act, will have to be maintained in permissible condition. Therefore, to obtain the maximum protection from permissible equipment available at a mine, every effort should be made to assign this equipment, where practicable, to those areas in the mine where methane is most likely to be encountered.

## Electric Face Equipment

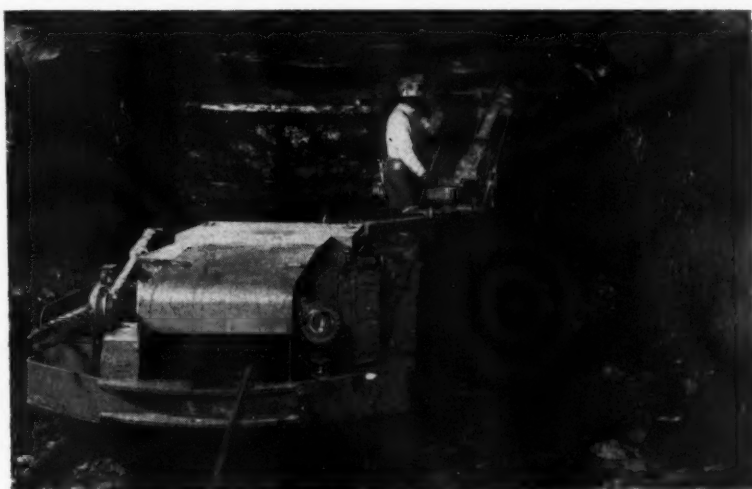
A more thorough understanding of Section 209(f) of the Act and its practical application to mines can best be obtained by a discussion in question and answer form. Following are some of the questions most frequently asked:

**Q.:** What is meant by electric face equipment?

**A.:** Any electric equipment operated at or near the face. This would include drills, motor-driven dust collectors, rock dust distributors, cutting machines, loading machines, continuous miners, gathering locomotives, shuttle cars, and face conveyors. Room conveyors in which the motor drives are located at points where trolley or bare power wires would ordinarily be permitted are not considered face equipment.

**Q.:** At our mine the face equipment was purchased as permissible equipment prior to the effective date of the Act, but on the effective date of the Act was in a nonpermissible condition. Does the law now require us to maintain this equipment in a permissible condition?

**A.:** The Bureau of Mines says that electric face equipment that was purchased as permissible type, except where the permissibility of such equipment was voided by redesign or alteration—but not as a result of neglect—prior to July 16, 1952, or the date the mine became a gassy mine, whichever is later, will be regarded as permissible equipment irrespective of the state of maintenance as of the effective date of the Act or date of purchase. In other words, if the equipment was rendered nonpermissible by neglect, it will have to be restored to permissible condition and so maintained, but if it was rendered nonpermissible by redesign or alteration, it may be regarded as nonpermissible equipment and therefore need not be restored to permissible condition.



Many of the electrical problems arising out of Public Law 552 pertain to permissible face equipment

fective date of the Act, he can transfer it to the gassy mine without incurring a violation of the law; moreover, permissible and nonpermissible electric face equipment can be interchanged without restriction in any mine. There is one exception to the proviso which says that permissible electric face equipment in use in a gassy mine shall not be replaced by electric face equipment which is not permissible. This exception provides that explosion-tested cable-reel locomotives and shuttle cars may be used to replace permissible cable-reel locomotives and shuttle cars if such explosion-tested equipment was purchased by the present owner before permissible equipment became available.

## Multiple-Power Connections

Section 209(f) (2) of the Act provides that in a gassy mine permissible junction or distribution boxes shall be used for making multiple-power con-

in by the last open crosscut; and (3) what is meant by "other places where dangerous quantities of methane may be present or may enter the air current." No one knows at this stage exactly what these phrases mean. Any operator planning a new electrical layout for a mine would be well advised to have the plans approved by the Bureau in advance to avoid costly changes in the installation at some future date. The operator has a right to know in advance whether or not his proposed installation will meet with the Bureau's interpretation of the Act.

From the foregoing one can see that Congress recognized the disaster prevention qualities of permissible equipment but at the same time gave recognition to the economic factors involved. The effect of the law as written will be a slow but gradual replacement of nonpermissible equipment with more modern and more safely constructed



Attempts are being made to develop "alternate methods" of ground-fault protection

**Q.:** Does the Bureau's schedule for testing electric equipment require three-conductor cables for off-track face equipment, such as shuttle cars and rubber-tire mounted mining and loading machines?

**A.:** The schedule does not require three-conductor cables as such; however, the schedule does provide that the frame of a portable machine which receives power from an external source and which cannot be considered as being in intimate electrical contact with the earth, as when resting on timber or mounted on rubber tires, shall be adequately grounded. The power conductors shall not be used for grounding. The mandatory use of three-conductor cables is implied here because no practical way has yet been approved for providing ground-fault protection in such machines except through the use of three-conductor cables.

### Alternate Protection

**Q.:** What progress is being made toward the development of "alternate methods" for providing ground-fault protection?

**A.:** It appears that four different methods of ground-fault protection, other than the third conductor, are feasible. All four of these methods have been tested experimentally in the laboratory by the U. S. Bureau of Mines and all give promise of success. Two of these devices, the Short Circuiting Contactor and the Polarized Relay, can be installed in machines that are provided with contactors. A third method employing an electronic tube is an adaption of a system already in use on stripping shovels. These three methods operate to cut off the power automatically by opening the contactors in the event that a fault to ground develops within the machine. The fourth and least complicated method can be installed in a

machine that is not provided with contactors. The effect of this device is to create a direct short circuit in the power circuit within the machine in the event of a ground fault, this causing the fuse in the cable nip to burn out and cut off the power.

Plans are under way to test all of these systems underground under actual operating conditions. One manufacturer has become interested in the Polarized Relay method and has ordered heavy duty components, developed for railroad use, to build an experimental unit to try out underground.

**Q.:** Our permissible machines had three-conductor cables when put into service, but prior to July 16, 1952, the effective date of the Act, these cables

were replaced with two-conductor cables. Are we required under the law, to discard the two-conductor cables and now replace them with three-conductor cables?

**A.:** The answer is no, because the machines did not conform to the legal definition of the term "permissible" on the effective date of the Act. The machines were not permissible on that date, and therefore need not now be maintained in a permissible condition.

**Q.:** Our permissible machines purchased after July 16, 1952, the effective date of the Act, were equipped with three-conductor cables. Can we now legally substitute two-conductor cables?

**A.:** Not until some other effective means of grounding is provided and until the Bureau revises Schedule 2E.

**Q.:** The approval plates have been lost off of our permissible machines. Can the Bureau require us to have these plates replaced?

**A.:** Yes, but under present instructions the Bureau is not treating this as a violation of the law.

### Who Can Alter Machines?

**Q.:** We desire to make some mechanical alterations on our permissible machines such as changing the seating facilities, altering the hydraulic system, and installing longer cutter bars. Can this be done without incurring a violation of the law?

**A.:** Mechanical changes that do not affect the explosion-proof compartments or impair the explosion-proof or fireproof features of the machines may be made without violating the law. It is advisable, however, to consult with a Bureau electrical engineer before making such changes.



Mechanical changes in face equipment can be made legally, if they do not affect the explosion-proof compartments or impair the explosion-proof or fireproof features of the machine

**Q:** We desire to make some electrical alterations on our permissible cutting machines such as the installation of nonpermissible Miller plugs to provide power outlets for our electric drills. Can this be done without violating the law?

**A:** No, it cannot, although the Bureau is seeking some means by which safe electrical alterations may be made on permissible machines without voiding their permissibility. At present electrical alterations may not be made on permissible machines without going through a very complicated and time-consuming procedure of obtaining an extension of approval.

**Q:** Can a manufacturer make an electrical alteration on a permissible machine that has been installed at a mine without destroying its permissibility? For example, can he install a permissible power outlet or junction box on a cutting machine for the attachment of a permissible electric drill? The cutting machine as originally approved did not have such a power outlet.

**A:** Yes, the manufacturer can make such an installation after first having obtained an extension of the original approval of the machine from the Bureau of Mines. This is a lengthy and complicated procedure and one which has subjected the Bureau to much criticism. It is believed that the procedure could be streamlined to the point where it would not be a burden on either the manufacturer or the industry.

**Q:** Our company owns some track-mounted permissible drilling machines. In order to maintain our rock-dusting close to the face without interfering with the production cycle, we desire to mount permissible rock-dusting machines on the drill trucks. The rock-dusting machines are to obtain their power from the drilling machine circuit. The drilling machines and rock-dusting machines were produced by different manufacturers. Since this is an electrical and mechanical alteration, can we obtain the Bureau's approval?

**A:** A mining company could obtain approval by the Bureau for a combination of this kind but the procedure is so complicated and time-consuming as to make it almost impossible to do so. It is in situations of this kind that the Bureau's system of permissibility, as administered, becomes a serious impediment to safety. The Bureau could, and we hope soon will, make a substantial contribution to the progress of safety in the industry by modernizing its procedure for handling approval of electrical alterations.

**Q:** We have some permissible shuttle cars at one of our gassy mines which we would like to transfer to a more gassy mine. Can we replace these permissible shuttle cars with ex-

plosion-tested shuttle cars which we now own?

**A:** Yes, this is permitted under a special provision of Section 209(f) (1) of the Act.

**Q:** A manufacturer desires to install an experimental loading machine in our mine. The machine has been designed to meet the Bureau's schedule for permissibility but has not been submitted to the Bureau for approval tests. Would such an installation be a violation of the law?

**A:** Such installation would be a violation of the law if the mine is gassy and the Federal Inspector would undoubtedly prevent continued use of the machine unless the manufacturer had obtained temporary approval of the machine from the Bureau. It is my understanding that the Bureau is about to revise its procedures to per-



Primary defenses against gas ignitions have always been, and will continue to be adequate ventilation and eternal vigilance

mit the development and testing of new machinery in gassy mines prior to formal approval under certain controlled conditions.

### How to Handle Findings

Electrical problems related to Public Law 552 may arise at your mine because of an unjustified action taken by a Federal Coal Mine Inspector in reporting a violation. If the matter in question involves a clear-cut and acknowledged violation of Public Law 552, there is nothing much to be done but to comply with the inspector's finding. The mere fact that compliance with the inspector's recommendation would create an undue hardship would not be a cause for relief before the Federal Coal Mine Safety Board of Review or the Court. There may be instances, however, in which the operator feels that the amount of time specified by the inspector for compliance is insufficient. In such cases, an

informal request should be made to the inspector's supervisor for more time to comply. You will find that the Bureau is willing to grant ample time for compliance if the operator shows a disposition to comply. If, on the other hand, an inspector or his supervisor fails to allow a sufficient time to comply and a withdrawal order is issued on the grounds that a reasonable time specified by the inspector had expired, the operator can apply to the Director or the Board for an annulment of the order, but only after he has complied with the withdrawal order.

Instances arise in which an inspector issues a finding of an alleged violation, stating a specified time in which to comply, and the operator believes that the inspector has not interpreted or applied the provisions of the Act correctly. In such cases it is possible and entirely fitting for the operator to make an informal protest to the Director of the Bureau of Mines. Such protests are given careful consideration by the Director who may or may not concur with the operator's position. In the event that the Director rejects such a protest and the Federal Inspector subsequently issues a withdrawal order, the operator can apply to the Federal Coal Mine Safety Board of Review for annulment of such order after he has complied with the order to withdraw the men from the mine or the affected area.

### Problems Related to the Code

Electrical problems related to the Federal Mine Safety Code are handled in a somewhat different manner. First, it should be remembered that Code items are purely recommendatory insofar as the U. S. Bureau of Mines is concerned. The Bureau does not have the authority to enforce the provisions of the Code. Many companies, however, as a matter of policy, endeavor to comply with all of the recommendations of the Federal Inspectors based on the Code provisions. Inasmuch as a procedure has been established in the wage agreements for obtaining relief from unjustified recommendations of Federal Inspectors, these inspectors are required by their supervisors to cite all violations of the Code observed during inspection regardless of whether or not compliance is feasible or practical. In these instances the management may appeal to the Joint Industry Safety Committee for relief from the inspector's recommendations and if the management is able to show justification for relief, the Committee will issue a decision relieving the operator from compliance. This decision has the effect of nullifying the recommendation of the Federal Inspector. It is of interest to note in passing, that whenever an operator

(Continued on page 109)





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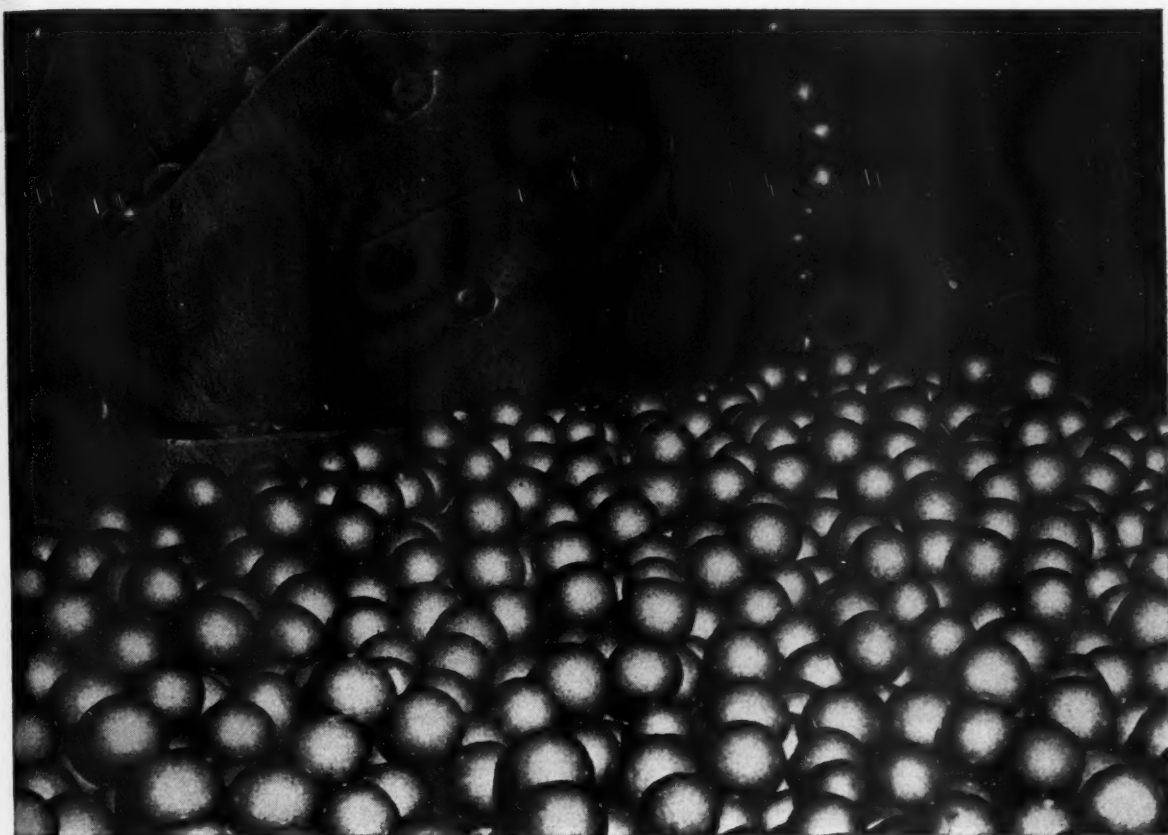
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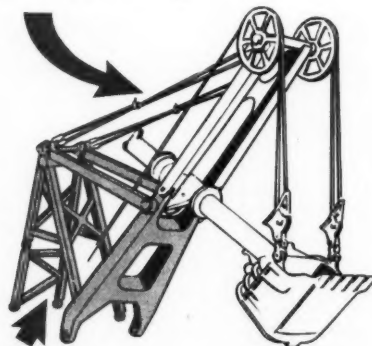


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23154





Mill efficiency depends on screen performance

# Help the Blind

## Screen Blinding Cuts Down on Efficiency But Can Be Remedied

By J. E. FINK

Processing Machinery Dept.  
Allis-Chalmers Mfg. Co.

FORTUNATELY, the blindness referred to in the title is a disease diagnosed scientifically as closing of the interstices in a screening medium, commonly known as blinding or plugging of the screen surfaces. The illness or defect being considered, and the problems connected with it, is not nearly as serious or impossible to cure as the loss of sight.

The comparison of a vibrating screen to medical science could be carried further but extending the comparison would have no purpose. The important thought to be gained is that there are definite causes of blinding of screen surfaces, and more important. There are definite cures.

The function of a vibrating screen is to separate material by difference in size. This is true if the job to be done is a straight sizing job such as separating coal, iron ore, or aggregate into various sizes, or if it is a washing or dewatering job.

The important element of the machine for accomplishing this function is the screen surface or deck. The vibrating screen body, including the mechanism, is the unit that imparts motion or movement to the screen surface so that it can perform its function. If for any reason the openings in the screen surface should become plugged or partially plugged, the whole machine becomes less effective and ultimately results in increased production costs and decreased profits.

Naturally no material can pass through screen surface openings that closed. Any blinding that takes place in effect reduces the screen area available in direct proportion to the percent of blinding. To compensate for this reduction in screen area, the amount of material fed to the screen must be reduced if the efficiency is to be maintained; or if the quantity is maintained, the efficiency will diminish.

In addition to this direct effect on quantity and quality of production, other costs are incurred as a result of blinding. These include labor costs for cleaning by either brushing the screen surfaces or pounding the finer cloths with hoses or the coarse cloth with hammers. All such remedies reduce the life of the screen surface. Production time lost while cleaning the screen cloth can also be a costly item.

### Causes of Blinding

Blinding of screen surfaces is generally due to one of three easily ascertained causes. Unfortunately, the cure cannot be effected quite so easily in all cases. The three general causes of blinding are: improper operating characteristics of the vibrating screen; moisture present in the material being screened on finer meshes, and irregular particle shape of the material being screened.

The important operating characteristics of a vibrating screen are speed or frequency of vibration, amplitude of motion, direction of rotation, and slope of screen surface. If the vibrating screen supplier has been completely apprised of the application for which the screen is to be used, he will arrange for the proper combination of speed and amplitude for a horizontal screen. Where an inclined screen is wanted he will recommend the correct slope at which it should be installed and specify the direction of mechanism rotation.

In the case of either horizontal or inclined screens, larger amplitude of motion is required for larger screen surface openings.

Table I gives the operating characteristics recommended by one manufacturer for its inclined screens.

### May Need Alterations

When an existing screen is to be used for an application other than that for which it was originally intended, it would be well to check with the screen supplier to see if any of the operating characteristics need modification.

Modifications may be needed to change the amplitude and speed to make it suitable. Increases in amplitude and speed should be made only after approval of the screen supplier to avoid overloading bearings. At the same time the supplier can also check the mechanical construction of the screen to make sure it is structurally suitable, particularly if the new application is more severe.

Blinding due to moisture in material usually is the most troublesome with openings up to  $\frac{1}{2}$  in. The moisture in the material causes the fines to cling to the wires in the screen surface as well as to other fine material. This build-up of fine material partially closes the openings in the screen surface, and in some cases may completely close them.

In some cases this trouble can be alleviated or overcome by changing the screen surface from a square opening to a rectangular opening wire cloth. Frequently more drastic action such as knocking the fines off the screen surface by impact or heating of the screen surface is necessary.

Where blinding due to moisture in the material is occasional, it can often be overcome by manual means, such as brushing the cloth or striking it with a hose to dislodge the damp material. However, the labor involved

Screen Opening, Round or Square (inches)	Throw (inches)	Speed (rpm)	Angle of Operation	Direction of Rotation
35 mesh to $\frac{1}{8}$	$\frac{1}{4}$	950-1100	$22\frac{1}{2}$ - $25^\circ$	Counterflow
$\frac{1}{8}$ to 2	$\frac{5}{16}$	850-950	$18-20^\circ$	Flow
$2\frac{1}{8}$ to 2	$\frac{3}{8}$	800-900	$18-20^\circ$	Flow
$5\frac{1}{8}$ to 8	$\frac{7}{16}$	700-750	$18-20^\circ$	Flow
$8\frac{1}{8}$ to 10	$\frac{1}{2}$	650-700	$18-20^\circ$	Flow

can become an expense if moisture in the material is a common occurrence.

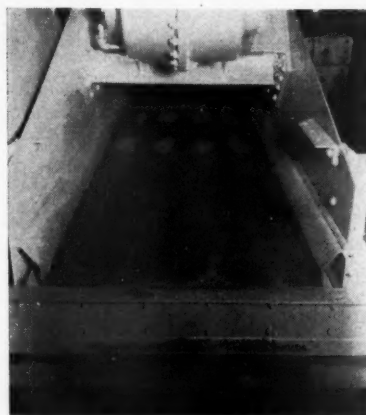
To eliminate this inconvenient method and its accompanying expense, continual and effective impact can be obtained by allowing rubber balls to bounce against the underside of the screen surface. The impact of the rubber balls against a properly tensioned wire cloth causes a secondary

vibration in the wires which tends to dislodge moist material clinging to the wires. This method of eliminating blinding due to moisture is used by several vibrating screen manufacturers.

### Heated Screen Cloths

Elimination of blinding by heating the screen surface has become increasingly popular in the last several years. The heat created in the screen surface by an electrical current dries the moisture out of the particles clinging to the wire cloth. When the moisture in these particles is sufficiently reduced, they drop off of the wires. Naturally other moist material takes the place of the dried particles, but the continuous supply of heat keeps material from building up on the cloth.

Heating the screen surface is accomplished by passing a low voltage electric current through the screen surface. Low voltage current is used to insure safety and is produced by single phase transformers having variable secondary voltages of approximately three to eight volts. The adjustable secondary voltage allows for varying the heating to suit changing moisture in the material.



Screen openings partially closed because of moisture in feed

### Keep Heavy Screens Clean

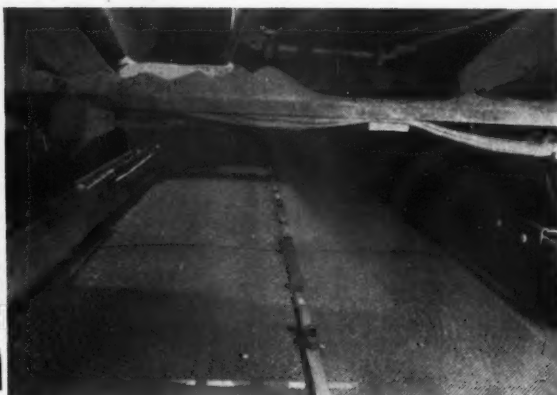
For larger screen cloth openings, which in turn mean larger wire diameters, both the continual impact method and the electrical heating method of eliminating blinding become ineffective. For heavier wires the mass of the balls required to produce a secondary vibration in the wires would be unreasonably large.

With larger openings and larger wire diameters, the electrical resistance of the screen cloth decreases. Adequate heating would require large and expensive transformers due to the high current requirements.

In place of electrically heating such a screen surface, flame heating has been successfully used in some cases. This is done by placing gas burners below the screen which throw a long flame parallel to or at a slight angle to the underside of the screen cloth. The heat thus produced dries the damp, sticky material clinging to the screen surface. The hot gases of com-



Rubber balls that bounce against the screen cloth as the screen body vibrates dislodge fine moist particles



Heating effect of low voltage current eliminates blinding by moist material—(left) current off, screen blinded. (right) current on, screen efficiency restored

bustion and the proximity of the flame to the mechanism usually make it necessary to cool the screen mechanism.

Special screen surface arrangements have been developed to eliminate blinding of larger openings due to sticky material. The long slotted openings used in these arrangements reduces the tendency for sticky material to plug the openings, simply because they offer more open area and because in the flow of material there are no cross rods or wires on which sticky material tends to collect.

### Slabby Material Wedges In

Slabby or slivery material can be a source of trouble whether it is screened in the done dry state or if the screening operation is performed wet. These particles plug the screen surface by wedging themselves into it so tightly that the vibration of the screen cannot throw them out.

Openings up to  $\frac{3}{4}$  in. can be kept clean by making use of continual impact on the cloth with rubber balls as previously described. For larger openings, perforated plate should usually be substituted for wire cloth. The wires forming the openings in a wire cloth are flexible to a degree. When a wedge shaped piece enters the opening, it tends to spread the wires, but the wires in turn exert an increasing force on the particle due to the spring action of the wires. Since the bars between the holes in perforated plates are more rigid, this spring or wedging tendency is diminished.

Where exceptionally elongated pieces are encountered, they may get into the openings in a perforated plate, and peculiarly enough are not thrown out of the opening by the vibration of the screen even though they are not wedged into the opening. If occasional pieces of this kind are encountered, remedial measures may not be required since the action of the screen and other material passing over the particle will eventually cause

it to wear itself down and pass through the opening, particularly if the material is relatively soft or friable.

Large numbers of these elongated pieces if hard or highly abrasive material will not wear themselves down

readily and will require remedial measures, both to overcome the blinding and to avoid excessive wear on the screen surface.

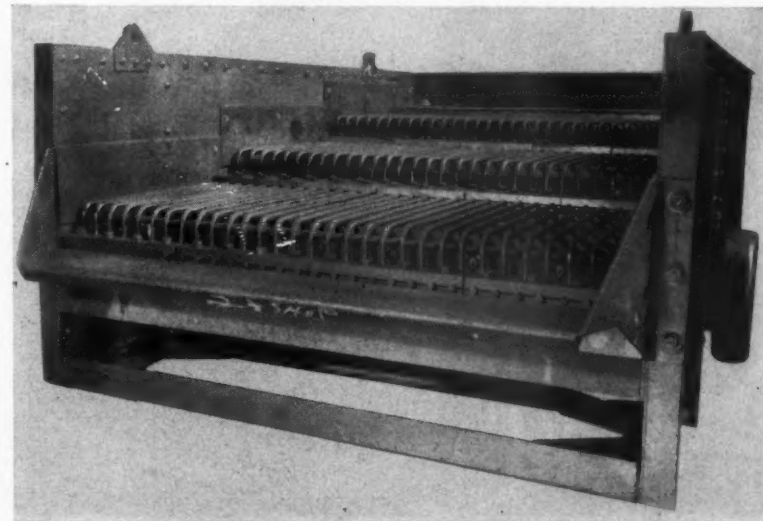
More force is required to throw elongated pieces out of the screen surface openings than is required for cubical material. This additional force is obtained either by increasing the speed or the amplitude of vibration. Increasing the amplitude seems to be the most effective. However, before increasing either the speed or the amplitude be sure to consult the screen supplier.

Where a slot size separation is permissible, a slotted opening in the screen surfaces can be used to relieve the blinding due to slabby material.

This completes the description of Causes and Cures of screen surface blinding. Remember that your vibrating screen supplier can in effect be the doctor. His wide experience with similar problems makes him suited to help you cure the difficulty in the shortest possible time and at the least expense.



Blinding due to slabby material can be relieved by using slot type opening

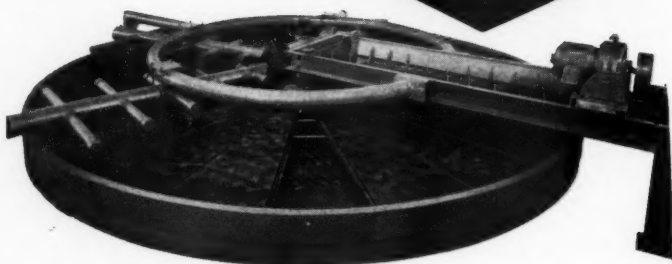


Step between rod sections allows free discharge from open end slot



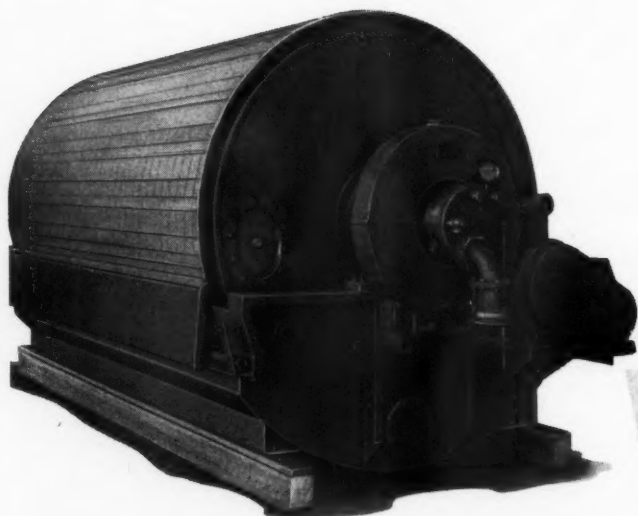


# ORE

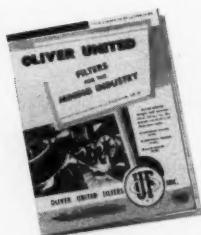


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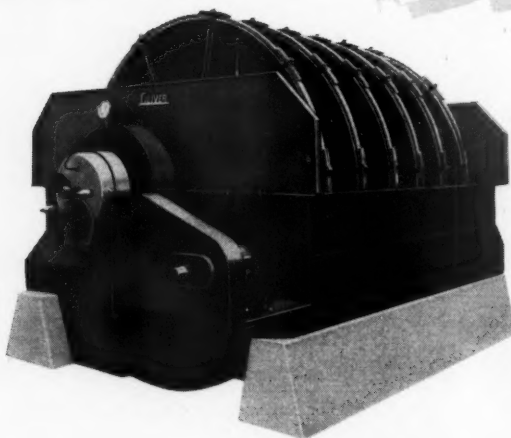
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**MINING SHOW  
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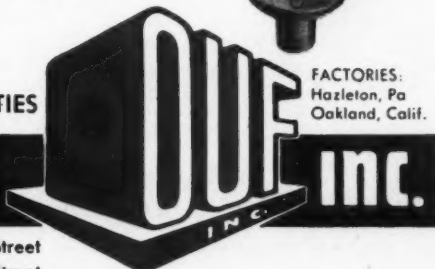
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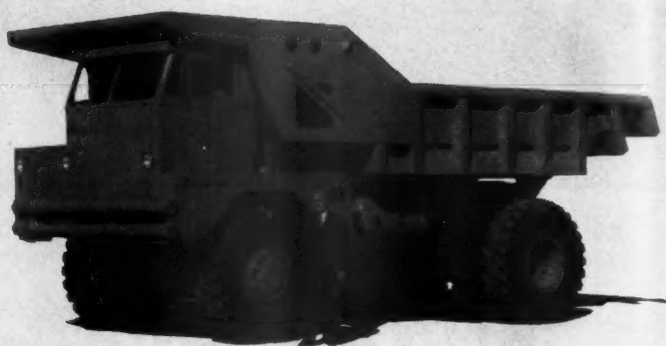
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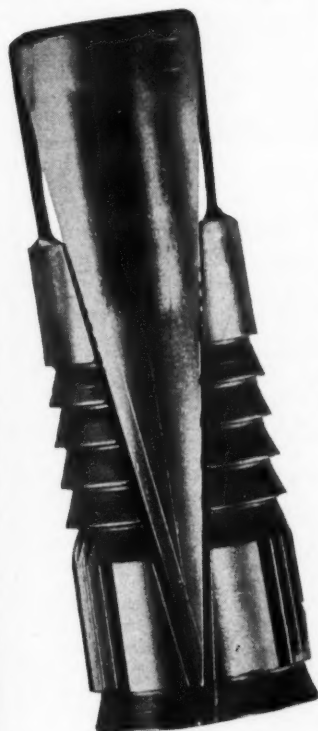
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## Electrical Problems

(Continued from page 99)

appeals to the Joint Industry Safety Committee from a violation reported by a Federal Inspector, the violation is automatically voided until such time as the Joint Industry Safety Committee renders its decision. To those of you who make an effort to keep your mine free of reported violations of the Code and are prevented from doing so by one or more unreasonable recommendations, I would urge that you submit your

difficulties to the Joint Industry Safety Committee for relief.

By reason of Public Law 552 and the Federal Mine Safety Code, the coal mining industry is participating in a system of safety and inspection that is different from the safety procedures in any other industry. This system is the outgrowth of the past accident and disaster record of which the industry is not proud. In spite of the minor irritations, and sometimes serious difficulties, that arise in its application, it is a moderate system. When administered properly, it does not impose an undue burden and yet seems to be getting results in improved accident and disaster records.

Despite the fact that the adoption of Public Law 552 has made the U. S. Bureau of Mines a law enforcement agency, the tradition of service to the industry still exists. I am confident that when the Bureau becomes fully aware of the problems and difficulties arising out of Public Law 552 concerning permissibility, appropriate steps will be taken to modernize and streamline the procedures and to coordinate them with the requirements of the law so that this important service will again be a benefit to the industry.

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plus value operation	available at National	at your present repair source
1. redesigning and modernizing by competent engineers	<i>yes</i>	_____
2. vapor degreasing to insure good bonding of varnish	<i>yes</i>	_____
3. corncob blasting to prepare surfaces like new	<i>yes</i>	_____
4. rebuilding and remachining to standard of mechanical fits	<i>yes</i>	_____
5. temporary hotbanding to seat coils in slots	<i>yes</i>	_____
6. hot rerolling of permanent bands	<i>yes</i>	_____
7. grinding and polishing of journal shafts	<i>yes</i>	_____
8. vacuum impregnating	<i>yes</i>	_____
9. dynamic balancing	<i>yes</i>	_____
10. grinding and polishing of commutator at top operating speed	<i>yes</i>	_____
11. load testing	<i>yes</i>	_____
12. high frequency testing	<i>yes</i>	_____
13. electronic bar-to-bar and high sensitivity ducter testing	<i>yes</i>	_____
14. surge comparison testing	<i>yes</i>	_____
15. high potential ground testing	<i>yes</i>	_____
16. magniflux testing	<i>yes</i>	_____
17. anti-friction bearing inspection	<i>yes</i>	_____
Total	<i>17</i>	_____

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# Wheels of GOVERNMENT



As Viewed by HARRY L. MOFFETT of the American Mining Congress

AS this issue goes to press, Congress is in the final days of the 83rd session and has written into law the major share of the President's legislative program. Adjournment is in the immediate offing but is somewhat clouded by a move in the Senate to censure Senator Joseph McCarthy (Rep., Wis.). Consideration is being given to adoption of a resolution permitting the House to adjourn and the Senate to continue in session to dispose of non-controversial House-approved measures as well as the proposed McCarthy censure resolution.

During the session Administration lieutenants on Capitol Hill were able to secure passage of an omnibus revenue measure providing tax relief for both industry and individuals, a revised social security statute, an overhaul of farm price supports, an extended housing program, authorization for the St. Lawrence Seaway, reduction of excise taxes, a one-year extension of the trade agreements program, a broad highway construction program, a liberalized atomic energy act, and appropriations to support a tight Federal budget.

Congress refused to stamp approval upon such major pieces of legislation as statehood for Alaska and Hawaii, revision of the Taft-Hartley Act, votes for 18-year-olds, and a health re-insurance program.

On the mining front, no legislation was enacted adverse to the mining industry. Major benefits accrued to the industry through passage of the tax revision bill, and a land law revision measure which makes possible the location of mining claims upon oil lands and validates locations for fissionable source materials.

## Tariff Decision Awaited

The day of decision as to possible tariff relief for the domestic lead and zinc mining industries—July 21—came and went without the President taking any positive action on the Tariff Commission's recommendations that the tariff rates on these metals be increased 50 percent above those

in effect on January 1, 1945. Instead of acting at that time the President notified the chairmen of the House Ways and Means and Senate Finance Committees that he believed the question needed further study.

The President told the committees that the interested departments and agencies of the Executive Branch of the Government had been giving "earnest and intensive consideration" to the recommendations, but since the decision involved fundamental issues of economics and public policy it "must be based on the most comprehensive analysis of all of the relevant factors."

The President made public at the same time the Tariff Commission's full report and recommendations on the domestic lead-zinc mining industries' plea for escape clause relief. In its report the Commission unanimously found that both of these domestic industries were suffering serious injury as a result of importation from foreign sources. The Commission did not recommend import quotas for lead or zinc stating that such a system, if applied to ores or concentrates, would prove complicated and difficult, if not impossible, to administer.

Close on the heels of the President's announcement that he was postponing his decision, some 30 Senators from lead and zinc producing areas sent him a letter offering their services in assisting him to arrive at an early determination. They pointed out, as they had before, that many mines have postponed shutting down awaiting the Government's action on the escape clause petition, and said that producers "have tried to remain patient under advice from high Administration officials that the machinery of the Trade Agreements Act should be the proper approach."

Since then there have been several meetings of high Government officials to discuss the Administration's action. With the single exception of the State Department the remainder of the agencies and departments lean towards increasing the tariff. However, it is understood that some considera-

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## Washington Highlights

**ADMINISTRATION PROGRAM:** Enacted in main.

**TARIFF RELIEF:** Before Cabinet Committee.

**STOCKPILING:** New funds voted.

**PUBLIC LANDS:** Law revisions adopted.

**TAX BILL:** Becomes law.

**COAL-ENERGY STUDIES:** In progress.

**MINES BUREAU:** Being reorganized.

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tion is being given to initiation of a subsidy program in lieu of tariff relief. Administration officials have indicated that they hoped to solve the situation before Congress adjourns. However, many in industry and on Capitol Hill feel that the decision may be delayed until after Congress departs from Washington, thus lessening the drive for tariff relief.

Some hope for possible favorable action for lead and zinc was gleaned from the President's action in raising the duty on imported watch movements. He termed the domestic watch industry essential to defense and said it was seriously threatened by imports. Both statements also apply to the domestic lead and zinc industries.

Meanwhile, when the foreign aid authorization bill was before the Senate, Senator George W. Malone of Nevada successfully sponsored an amendment which precludes the use of foreign aid funds for development and expansion of mineral production abroad.

## Stockpiling Programs

During the closing days of the session, Congress stamped its final okay on the Administration's request for an



additional \$380 million to acquire materials for the strategic stockpile. The President had sought these new funds in order to expand stockpiling programs with a view to aiding domestic mineral industries.

Meanwhile the Office of Defense Mobilization continues to review the present stockpile goals for metals and minerals, and is expected to announce one or two new programs in the near future. Indications are that programs calling for increased stockpiling of antimony and fluorspar are likely to be established by the end of the month.

To date, ODM has put into effect increased stockpiling of lead, zinc, and mercury. The latter program, calling for a 3½-year purchase program of 125,000 flasks from U. S. producers and 75,000 flasks from Mexican mines at a ceiling price of \$225 per flask, is not stimulating much interest domestically. U. S. producers already are readily able to market their output at prices well above the Government figure and are not willing to expand production substantially unless a higher price is guaranteed.

### Mining Law Amendments

Early in August the President signed into law a measure making the greatest change in the mining laws since their inception in 1872. He affixed his signature to a bill which permits multiple mineral development of the same tracts of land, provides procedures for resolving conflicts between mining locations and mineral leases upon the public domain, and makes it crystal clear that mining locations may be based on fissionable materials.

The legislation had the strong support of the mining, uranium and oil and gas industries and was over a year in development. Both the Interior Department and the Atomic Energy Commission endorsed the bill.

The new law opens to location under the mining laws some 60 million acres now withdrawn under terms of the Mineral Leasing Act, validates claims located between July 31, 1939 and February 10, 1954 on Leasing Act lands, and provides that owners of unpatented mining claims may sell or assign their possessory rights to Leasing Act materials. It reserves to the United States title to Leasing Act minerals—oil, gas, coal, phosphate, sodium, or oil shale—on all claims hereafter located, but provides that patents issued for such claims shall contain such a reservation only as to lands which, at the time of issuance of patent, are known to be valuable for Leasing Act minerals or are covered by an application or permit under the leasing laws. The new law further provides a procedure whereby the owner of an unpatented mining claim may assert his rights in the Leasing Act minerals.

Congress failed to act on other measures which would amend the mining laws.

### New Tax Law

As a result of almost two year's work, Congress has completed the first comprehensive revision of the Internal Revenue laws since before the turn of the century. At this writing the tax overhaul bill is awaiting the President's signature.

Included in this major undertaking are several provisions which directly affect the mining industry. The new law liberalizes the "definition of mineral property" by permitting a taxpayer to elect to treat as one property, for purposes of both percentage and cost depletion, an aggregation of two or more separate operating mineral interests which constitute a part or all of an operating unit. Increased depletion allowances are provided for many minerals, including a 23 percent rate for uranium and for the domestic mining of 36 strategic and critical minerals.

The new law also provides a 15 percent depletion rate generally to "all other minerals" not otherwise specifically designated. As to these and as to a large number of nonmetallic minerals which are designated, it is provided that in general the depletion allowance shall be 5 percent instead of 15 percent when the material is used or sold for use as "riprap, ballast, road material, concrete aggregates, or for similar purposes."

The new tax code makes it clear that percentage depletion is allowable to mine owners or operators on extraction of the ores or minerals from waste or residue of their prior mining.

The definition of "ordinary treatment processes," for the purposes of computing percentage depletion allowances, is liberalized in the case of coal, phosphate rock, magnesite, and talc.

The new law raises from \$75,000 to \$100,000 the allowable deduction for exploration expenditures in any one year; however, this deduction is still limited to only four taxable years.

As to the net operating loss deduction, the revised code provides that both in the year of loss and in computing the loss carry-over, no adjustments (reduction of the net operating loss or of the carry-over) are to be made for percentage depletion in excess of cost depletion.

These and other provisions in the new tax law are designed to encourage and strengthen the domestic mining industry.

Other changes of interest include a start toward easing of the double taxation of corporate dividends, a requirement that a corporation file estimated declarations of tax and make advance payments when its tax liability exceeds \$100,000, and retention of the

present 52 percent corporate tax rate for another year.

### Coal-Energy Studies

Problems of the bituminous and anthracite coal industries are coming in for close scrutiny by the Administration in an endeavor to find ways to alleviate the ills of these two basic fuel industries. The President has named a Government Committee, composed of ODM Director Arthur Flemming (chairman), Assistant Secretary of Defense Thomas P. Pike, Assistant Secretary of Interior Felix E. Wormser, and Assistant Secretary of Labor Rocco C. Siciliano.

This group will study the problems of the industries and recommend remedies.

Its formation was spurred by recent action of the Governor's Fuel Conference, which adopted a series of resolutions calling for a study of the nation's fuel resources and their importance to national defense; a conference of Governors, Senators and Representatives from coal producing states in Washington immediately upon the convening of the next Congress to discuss ways of relieving the plight of the coal industry, and the formation of individual State fuel conferences to aid in implementing any national program adopted.

Following on the heels of the announcement of these resolutions, Senator George Malone said that the Senate Interior Subcommittee on Minerals, Materials and Fuels, which he heads, will give expeditious attention to the recommendation for a study of the country's fuel resources.

Meanwhile, the President has also named an interdepartmental committee on Energy Supply and Resources Policy, composed of the Secretaries of State, Defense, Justice, Interior, Commerce, and Labor and the Director of the Office of Defense Mobilization, to study all factors relating to U. S. needs and supplies of major sources of energy, including anthracite and bituminous coal.

### Mines Bureau Reorganized

Interior Secretary Douglas McKay has ordered a reorganization of the Bureau of Mines as a result of a study made by a survey team composed of Dean Curtis L. Wilson of the Missouri School of Mines (chairman); John C. Kinnear, Sr., former vice-president, Kennecott Copper Corp.; Dennis L. McElroy, vice-president, Pittsburgh Consolidation Coal Co.; J. R. Butler, president, Butler Johnson Corp.; and Spencer S. Shannon, formerly with the National Security Resources Board.

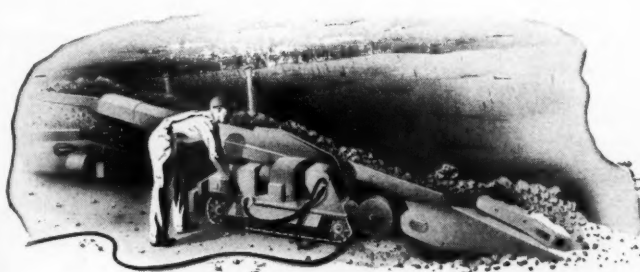
The survey group made 39 recommendations, of which Secretary McKay adopted 34 and ordered them put into effect. He reserved for further

*(Continued on page 131)*

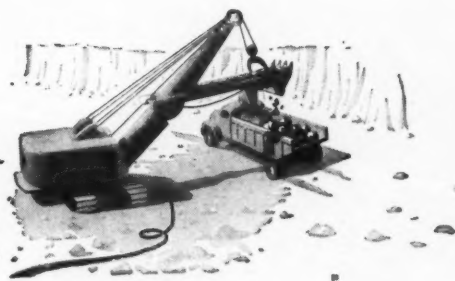


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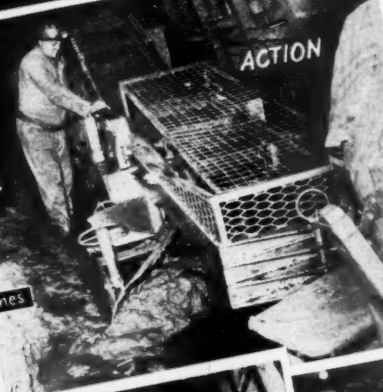
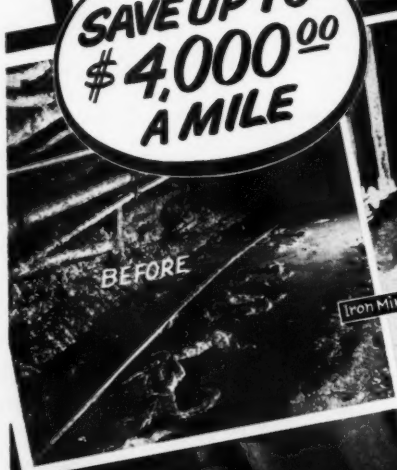
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# Personals

**Robert Lilly**, first safety director of the West Virginia State Department of Mines, has retired after serving 35 years in various capacities. His most recent position was with the department's accident prevention commission.

**William C. Browning**, western representative, Gold Fields Development Co., Ltd., received an honorary Doctor of Engineering degree at commencement exercises of the University of Utah, June 7. Dr. Carl J. Christensen, acting dean of the college of mines and mineral industries, cited the eminent mining engineer for his untiring work in "the development of the West through winning and preparation of its mineral values for the use and benefit of men everywhere."

**S. F. Sherwood** has succeeded **R. H. Sherwood** as president of the Stonefort Coal Co., Indianapolis, Ind. **R. H. Sherwood** is now chairman of the board and **Reed Moyer** vice-president.

**R. H. B. Jones**, consulting geologist for Oliver Iron Mining Division, U. S. Steel Corp., has been appointed staff geologist for the corporation's Columbia-Geneva Steel Division with headquarters in San Francisco. Jones joined U. S. Steel in 1930 as a geologist for Oliver Iron Mining Co. He was promoted to chief geologist in 1940 and became consulting geologist in 1953.

**B. F. Reed** was recently elected president of the Kentucky Coal Assn. succeeding **M. K. Eblen**. **George Ward** was reelected secretary-treasurer.

The New Jersey Zinc Co. announces the election of **C. Howard George** as executive vice-president, and **L. S. Holstein** as vice-president. **George**, a vice-president for the past 10 years, is a veteran of 39 years' service with the company. **Holstein** served for

many years as general manager of manufacturing and, since 1947, as assistant to the president. He has been with the company for 42 years.

**Thor H. Kiilsgaard**, geologist with the United States Geological Survey office in Spokane, Wash., has been promoted to the Washington, D. C., office of the agency as staff assistant to the chief of the agency's mineral deposit branch.

**Godfrey B. Walker**, formerly with American Cyanamid Co., is engaged in consulting work on mining and metallurgical problems, especially those having to do with mineral dressing. His present address is 37 Lockwood Drive, Old Greenwich, Conn.

**Henry B. Fry** has been named assistant manager for administration and services of the Santa Fe operations office of the Atomic Energy Commission at Albuquerque, N. M. **Fry** formerly was manager of the New York operations office of the AEC.

At a meeting of the board of directors of the Chicago, Wilmington & Franklin Coal Co. held in mid-July, **F. Earle Snarr** was elected vice-president in charge of operations succeeding **H. A. Treadwell**, who has retired. **Treadwell** is well known throughout the mining industry. He was a pio-



F. E. Snarr



H. A. Treadwell

neer in the development of coal mine mechanization. By word and deed he has done much to promote the modernization of coal mining from the early concepts of mechanical loading through the present era of continuous mining.

**Snarr** started with C. W. & F. 30 years ago as an engineer. He has since served as mine superintendent

and general superintendent of mines with the company.

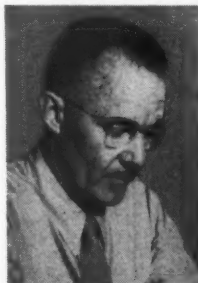
**William A. Harrigan**, Reno, Nev., has been named superintendent of mines at Park City, Utah, for New Park Mining Co., succeeding **Peter V. Joralemon**. **Joralemon**, who continues as a director of the firm, has entered the consulting field in San Francisco.

**Walter J. Johnson** has resigned as president of the Sheridan-Wyoming Coal Co. to assume a similar position with the recently organized Roundup Mining Co. at Roundup, Mont. Succeeding **Johnson** as head of Sheridan-Wyoming is **A. F. Denari**.

**George T. Harley**, for 10 years manager of International Minerals & Chemical Corp. potash mines at Carlsbad, N. M., retired July 1 under the regular retirement policy of the company.

**Harley**, who came to International as geologist in 1940, became manager of the mine location in 1944.

**Carl Arend** succeeded **Harley** as active manager of the installation in January of this year and since that time **Harley** has served as special consultant and advisor for the operation. He plans to engage in private practice as a geological and mining consultant.



G. T. Harley

**Edmund C. Bitzer**, metallurgical advisor, Division of Raw Materials, U. S. Atomic Energy Commission, on July 1 resigned that post to go into a private consulting practice in Golden, Colo. **Bitzer** joined AEC two years ago. At that time he was vice-president and general manager of the Colorado Iron Works.

At the recent meeting of the Rocky Mountain Coal Mining Institute, **C. A. Carlson**, president of Knight Ideal Coal Co. of Utah, was elected president. **I. N. Bayless**, president of Union Pacific Coal Co., was elected vice-president and **Fred W. Whiteside** was reelected secretary-treasurer.

The board of directors of the Sullivan Mining Co. announced in mid-June that **Ralph W. Neyman** has been named manager of the Star Mine of the Sullivan Mining Co. and that **Wallace Woolf** has been appointed manager of the company's electrolytic zinc plant near Kellogg, Idaho. Both men formerly held the position of superintendent at their respective operations in the Coeur d'Alene District of Idaho.

**Robert M. Reininger** was elected president and director of the New York and Honduras Rosario Mining Co. at a meeting of the Board of Directors on June 29.

Reininger, who has been with the company for 15 years in Central American operations and in New York, was executive vice-president before his election to the presidency. He succeeds the late William A. Prendergast.

**Peter Joralemon** is now associated with Ira B. Joralemon as consulting mining engineer and geologist at 315 Montgomery St., San Francisco 4, Calif.

**H. R. Rice**, formerly editor of the *Canadian Mining Journal*, has been selected to head up the Mining Department of the University of Toronto. Rice's practical experience includes work in many Canadian gold mines and in the deep Kolar fields in India and in Africa.

His successor, as editor of the *Canadian Mining Journal*, is **L. K. Walkom** who enters the publishing field with considerable experience in mining in the Kirkland Lake, Sudbury and Noranda areas.



**H. R. Rice**

**J. Frank Sharp**, chief geologist for Consolidated Coppermines Corp., at Kimberly, Nev., has been named superintendent of operations there for the firm.

**R. Emmet Doherty**, dust control engineer for the anthracite industry since 1946, recently resigned his position in order to open his own business of dust sampling, counting and analyzing and general consulting work at 85 Second Ave., Kingston, Pa.

**W. L. Petrie** has been elected president of the Lone Star Sulphur Corp. He succeeds **Frank Champion**.

Other officers elected at a recent meeting of the board of directors were announced as: **J. E. Westenberg**, executive vice-president and general manager; **J. Leslie Witt**, vice-president; **William G. B. Morrison**, secretary and general counsel, and **Charles N. McClelland**, treasurer.

**A. V. Sproles**, vice-president in charge of operations for the Pocahontas Fuel Co. of Pocahontas, Va., has announced two personnel changes. **James B. Gillespie**, who has been superintendent of the company's Angle mine, now fills a newly-created posi-

tion as manager of supplies. **Daniel C. Tabor** succeeds Gillespie as superintendent of Angle in addition to his duties as superintendent of the Jenkinjones mine.

**John W. Hill** has resigned from the United States Vanadium Co., a division of Union Carbide and Carbon Corp. He was general superintendent from 1948 to 1952, and manager of mines thereafter. He and associates have entered the uranium mining business on the Colorado Plateau. Hill is the general manager.

**North American Coal Corp.** has announced several operating department changes. **Roy W. Fox**, consulting engineer, has been elected vice-president and director of both the Powhatan Mining Co. and the North American

Coal & Dock Co. **Michael Yonko** has been promoted from superintendent of Powhatan No. 1 mine to general manager of three Powhatan deep mines, all in eastern Ohio. **R. A. Maurer** has been promoted from assistant to the president to superintendent of the Mead mine.

**Elof Enbom**, who has been associated with Hecla Mining Co. and its affiliates for the past 23 years has resigned to go into business for himself. Enbom had been office manager for both Hecla and its Polaris subsidiary, secretary of Polaris and assistant secretary of Hecla.

**D. W. Morehouse** succeeds him as Hecla secretary and **John R. Matthews**, formerly treasurer of Polaris, now becomes secretary-treasurer of that company.

## — Obituaries —

**Earl F. Maurer**, 54, vice-president and general manager of the Powhatan Mining Co., Powhatan Point, Ohio, died May 26.

The U. S. Embassy at New Delhi, India, has been informed that **Stanley M. Walker**, U. S. Bureau of Mines expert, died June 17 in Katmandu, Nepal.

**Stephen Royce**, 65, chief geologist for Pickands Mather & Co., died suddenly June 12.

Mr. Royce was graduated from Harvard University in 1911. He joined Pickands Mather & Co. in 1912 as chief engineer on the Gogebic iron range. He remained there for five years and then moved to Crystal Falls, Mich., to enter geological work. An ardent student in his profession, he had long been in intimate contact with all the iron ranges in the Lake Superior region.

**Dr. William Otis Hotchkiss**, 75, president emeritus of Rensselaer Polytechnic Institute, died June 20.

A native of Eau Claire, Wis., Dr. Hotchkiss was graduated from the University of Wisconsin in 1903. He was Wisconsin State geologist from 1909 to 1925. From 1925 until he went to Rensselaer, Dr. Hotchkiss was president of the Michigan College of Mining and Technology. He was president of Rensselaer from 1935 to 1943.

**Kenneth B. Frazer**, 65, assistant secretary and assistant treasurer of the Anaconda Copper Mining Co., died June 16 in Butte, Mont. Since 1929 he had been in charge of the accounting, auditing and fiscal departments of the company's western operations.

Mr. Frazer was a native of Rock Island, Ill. He joined the civil engineering department of the Anaconda Copper Mining Co. in 1905. In 1906

he was transferred to the foundry department and later became connected with the general offices. In 1913 he was transferred to the auditing department as one of the company's three traveling auditors and in 1916 was made chief clerk of the Great Falls Reduction Plant. He was made assistant secretary in 1929 and in 1942 elected assistant treasurer.

**Harry D. Hileman**, 84, died in Cleveland, Ohio, July 5.

Mr. Hileman was one of the real old timers in the coal industry. He began his business career at the age of 13 working underground. Since 1893, when he moved to Cleveland, he was principally associated with the Sterling properties, which include the Sterling Mining Co., the Sterling Coal Co., Ltd., of Canada, the Sterling Coal Sales Corp., and other allied and subsidiary companies.

**Joseph B. Cox**, 83, who helped found the Sunshine Mining Co. in the early 1920s died in Spokane, Wash., June 12.

Mr. Cox was vice-president and director of the Sunshine. He was also connected with the Sidney Mining Co. in its early days and was a former executive of Sidney Leasing Co.

**Harry Warren Payne**, 55, general manager and member of the board of directors of the American Coal Co. of Bluefield, W. Va., died June 26.

Mr. Payne had served 39 years with his company. He began his career in the coal industry as a payroll clerk at the American Coal Co.'s Piedmont mine in 1915. He rose to the position of assistant superintendent in 1918. In 1920 he was made superintendent at Piedmont and in 1935 was made general superintendent of all the American Coal Co. mines. He became general manager in 1949.

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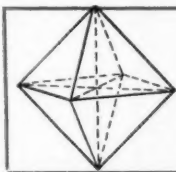
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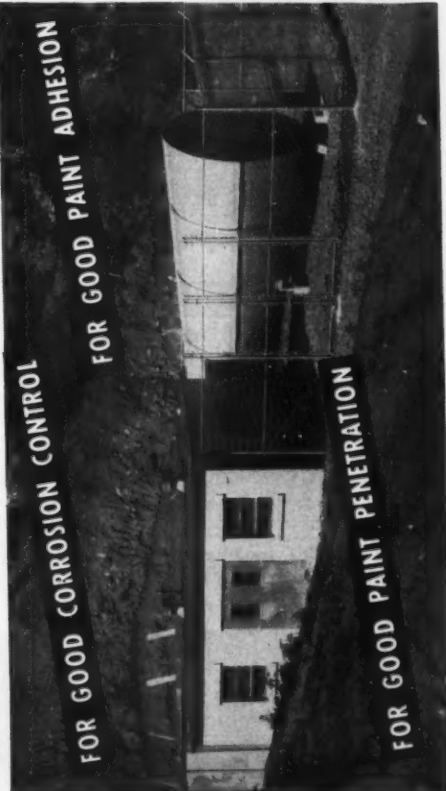
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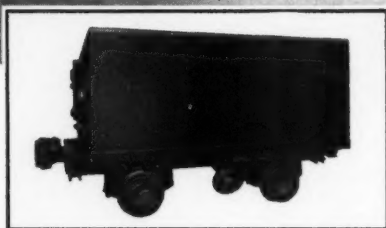
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# NEWS

## and VIEWS



### Eastern and Central States



#### Install Eight Tables

The Deister Concentrator Co. has recently supplied eight SuperDuty Diagonal Deck No. 7 Coal Washing Tables for cleaning the  $\frac{3}{8}$ -in. by 0 fraction at the Hutchinson Mine, Irwin, Pa., of the Westmoreland Coal Co.

#### Honor George Deike

On July 13 more than 100 friends of George H. Deike, chairman of the Board of Directors, Mine Safety Appliances Co., attended a party celebrating his 75th birthday. The party was held at the Longue Vue Country Club in Pittsburgh.

After dinner, Jack Ryan, Jr., introduced Harry Moses, who presented a scroll signed by all the guests present to Mr. Deike.

In the scroll Mr. Deike was described as:

"An industrialist who guided the growth of an industry; a citizen who recognized that our nation's progress depends on individual initiative and individual watchfulness; an educator who counseled and directed for the advantage of all and to the detriment of none; a humanitarian who lives by what most men preach; a leader who



G. H. Deike

leads surely without pressure — by common consent and never force; a friend of all who love freedom; an enemy only of the intolerant, the prejudiced and the unjust; a man's man."

#### Walsh-Healey and Mine Safety

Secretary of Labor James P. Mitchell and the Labor Department have started a full-scale campaign against unsafe conditions in coal mines doing business with the Government. Charges have already been brought against eight coal mines in Tennessee for violating the safety and health provision of the Walsh-Healey Act and action is being considered against 90 more according to reports.

The Secretary of Labor, under the Walsh-Healey Act, has power to require Government contractors to correct unsafe conditions or be barred from all further Government Contracts for three years.

The Secretary pointed out that where the number employed in a coal mine is 15 or more, the U. S. Bureau of Mines can require a correction, but

the mines in question employ less than 15 and the Walsh-Healey Act is the miners' only protection.

The mines charged with violations furnish coal to the Tennessee Valley Authority and therefore come under the jurisdiction of the Walsh-Healey Act.

#### To Up Ilmenite Output

Production of titanium-bearing ore in the sand hills of Bradford County, Fla., will be greatly increased next year when the Humphreys Gold Corp. puts its new dredge into operation near Lawtey, Fla. Completion date for the suction dredge and ore separation plant has been set tentatively for January 1955.

The plant is the third of its kind in Florida. However, recent reports of new discoveries of ilmenite sand deposits indicate the possibility of further development.

When in operation, the dredge will mine to depths of 50 ft. Ilmenite sand will then be separated from lighter waste soils and sent by pipe line to a drying plant for dewatering.

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## Gorgas to Reopen

The internationally known Gorgas, Ala., experiment in underground burning of coal probably will be resumed not later than 1955. This has been indicated by Dr. Milton H. Fies, consulting engineer and head of the coal mine division of the Alabama Power Co.

The Alabama Power Co., which conducted the experiment jointly with the U. S. Bureau of Mines, has been testing and evaluating results of the program since active experimentation was halted last July as an administration economy measure. It has been the contention of the sponsors all along that if properly examined, the Gorgas experiment would be found to have great merit.

The Gorgas program primarily was designed to develop a method of extracting synthetic fuel and certain by-products from coal which could not be economically mined with conventional methods. The first experiment started six years ago on a small scale.

## Good Public Relations

Minnesota's annual influx of tourists and vacation visitors will have an opportunity to witness the mining of iron ore this summer. U. S. Steel's Oliver Iron Mining Division reopened its string of observation stands across the Mesabi range on June 26. Stands are placed on choice locations at the mines near Marble, Chisholm, Hibbing, Virginia and Eveleth. Trained guides are on duty to explain the operations and answer questions.

An added attraction to visitors this year will be the inauguration of public tours through Oliver's Pilotac plant at Mountain Iron which will permit for the first time, public inspection of a taconite plant.

Last season 350,000 tourists visited the observation stands from June 15 to September 30. They came from all corners of the country and from many parts of the world.

Each observation stand is especially located to provide a comfortable and outstanding view of typical mining activities. At one stand the mining of low grade ores can be seen, while at another stand high grade ore mining is being done. Trucks can be seen at work from some viewpoints, while others show trains hauling the ore. Descriptive booklets and samples of iron ore are available for the asking. Altogether, the visitor is presented with a complete picture of Minnesota iron mining activities.

Highway signs along US Routes 53 and 169 guide the visitors to the observation stands. A sign at Mountain Iron points the way to Oliver's Pilotac taconite plant. Visitors can also get additional information from chambers of commerce along the Iron Range or in Duluth.

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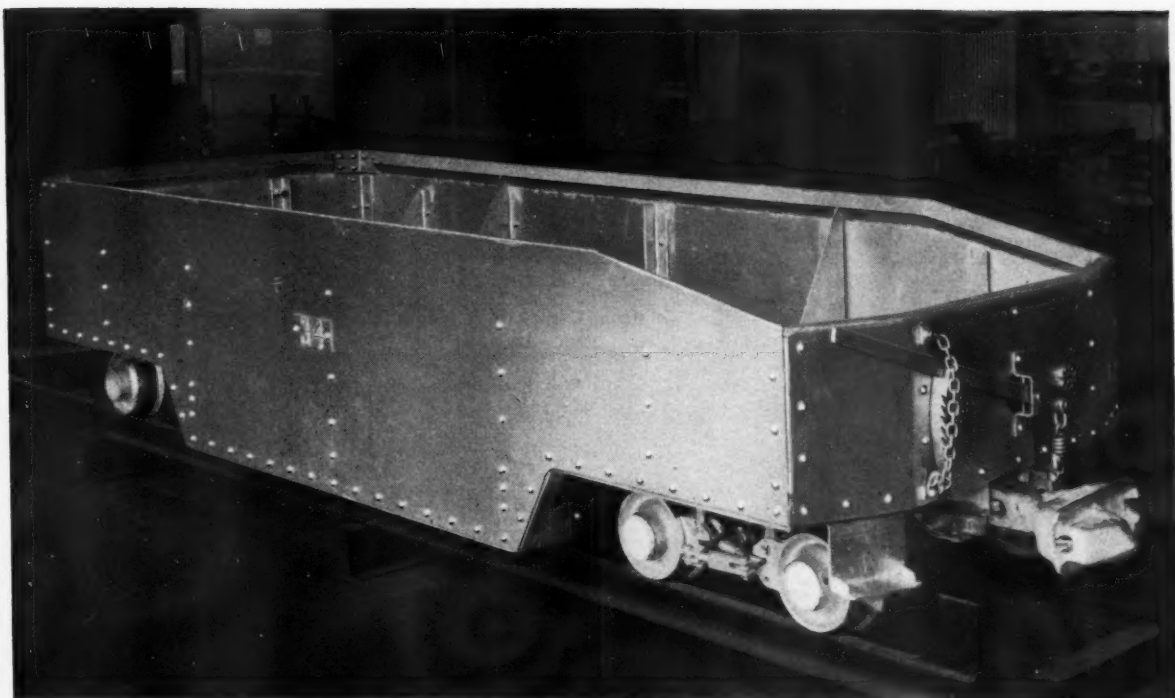
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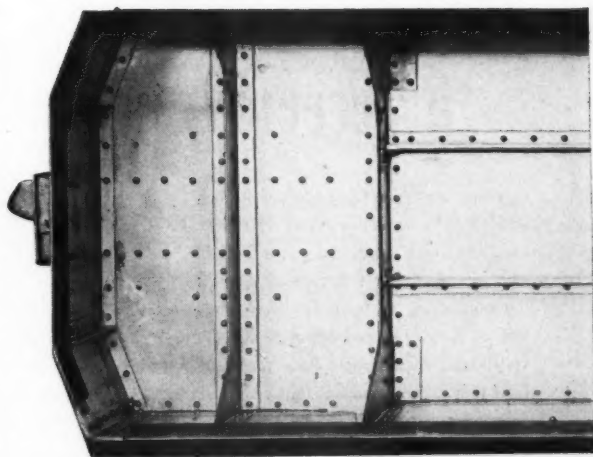
## For those who prefer an All-Riveted Car

This husky Bethlehem car is one that has proved very popular where an all-riveted type is preferred. Designed for use with 42-in. track, it has a capacity of approximately nine tons. Equipment includes 12-in. forged wheels, self-equalizing brakes, cast-steel trucks, and automatic couplers.

The car is built to take especially heavy punishment and to operate efficiently in high-speed mine-haulage systems. Because of its all-steel construction, maintenance costs are low. And the first cost is low, too.

Naturally, if you lean to the all-welded style of body, Bethlehem will gladly build it for you. Welded or riveted—this is a matter of choice, and our shops are well equipped to produce either kind. We also offer a wide selection of models: four- and eight-wheelers in end-dump, rotary-dump, high-side and low-side types.

Whenever you plan to add new cars, we hope you'll call us. Bethlehem engineers will help you develop the design that meets your needs, and the shops will take it from there. Or if you prefer, we'll build direct from your own design. Either way, you'll get the car you want—a car that will serve you well for years.



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## Give your SCREENS a screen test!

One sure way of testing the dewatering qualities of a screen is to run water over it. Nine times out of ten you'll find the screens with the best dewatering qualities have openings too large for profitable material retention. But this isn't true of Hendrick Wedge-Slot Screens. For Wedge-Slot Screens have very small openings yet have far greater draining and screening capacity. And they retain material that ordinarily would be wasted or cause expensive delays for reprocessing.

That's not all! Hendrick Wedge-Slot Screens have profile bars shaped to maintain uniform width of slot openings as wear progresses. If you would like to give your screens a test, then compare them with the results that can be obtained from Hendrick Wedge-Slot Screens, call your nearby Hendrick representative or write Hendrick direct.



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## New Safety Award

The Joseph A. Holmes Safety Association has authorized a safety award for men in the mining industry who have worked 20 or 30 years without a lost-time accident. The award is a lapel pin—gold for the 30-year men and silver for the 20-year men. Pins, which are a replica of the Joseph A. Holmes Safety Association seal, are to be purchased by the company mak-



ing the award upon application to the secretary of the Joseph A. Holmes Safety Association, who will furnish them at cost.

There are two restrictions. Those making application are responsible for the accuracy of the award recipient's accident-free record; and the recipient must be in the employ of the company when application is made.

A luminous decal to be worn on the recipient's hard hat will also accompany the award. Open to all branches of the mineral extractive industry, the award can be presented in any way the granting company desires.

## "Old Company" Ceases Operations

The Lehigh Navigation Coal Co., Inc., the nation's third largest anthracite producer, discontinued mining operations at its properties in northeastern Pennsylvania June 30. The company's action came at a meeting June 24 of the Board of Managers of the parent firm, The Lehigh Coal and Navigation Co.

On May 3 the coal company suspended operations indefinitely because of excessive financial losses. At that time the company reported it was losing \$10,000 a day. Within a week after the shutdown, the company offered to reopen six of its mines and coal preparation plants if the miners accepted a somewhat smaller working force and pledged strict adherence to the program so that increased efficiency could be obtained. Miners were asked to "work harder to produce more." John L. Lewis, United Mine Workers of America chieftain, urged acceptance of the company's terms. Five out of the six local unions affected by the move voted to return to the pits. However, the 900-member Tamaqua local, hardest hit by the proposed layoffs protested.

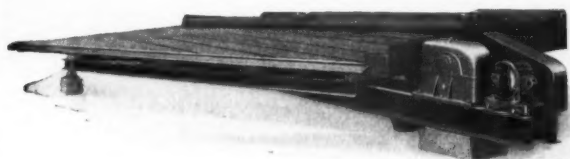
The Tamaqua miners sent pickets up and down the valley and members of the five other unions respected the

picket lines. The Tamaqua local, despite John L. Lewis' contention to the contrary, insisted the program offered by the company violated the UMW contract and they offered to return only under old conditions, which meant that no men would be laid off.

After thwarting efforts to resume operation, the Tamaqua local produced a last-minute counter proposal on June 24 proposing that they would work 20 days in order to give the company a cushion to absorb possible losses. However, the local insisted that

there be no changes in the current working agreement between the company and the UMW. This plan was not acceptable and the shutdown was ordered by the parent company's Board of Managers.

W. J. Parton, president of Lehigh Navigation Coal Co., has been appointed the administrator of the coal property, with powers to discuss possible offers from outside interests who might seek to operate the mines. Vital pumping operations are being continued.



## SuperDuty

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For maximum recovery of highest quality fine coal the SuperDuty DIAGONAL DECK coal washing table leads the field in low cost cleaning.

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## CONCENCO Feed Distributor

The CONCENCO revolving feed distributor is a heavily fabricated all-steel machine with motor drive requiring 1 H.P. or less in operation. It effectively provides a splitting of feed into any desired number of equal portions, to accurately feed circuits or machines in battery for greater overall efficiency. Unexcelled for feeding coal washing tables.

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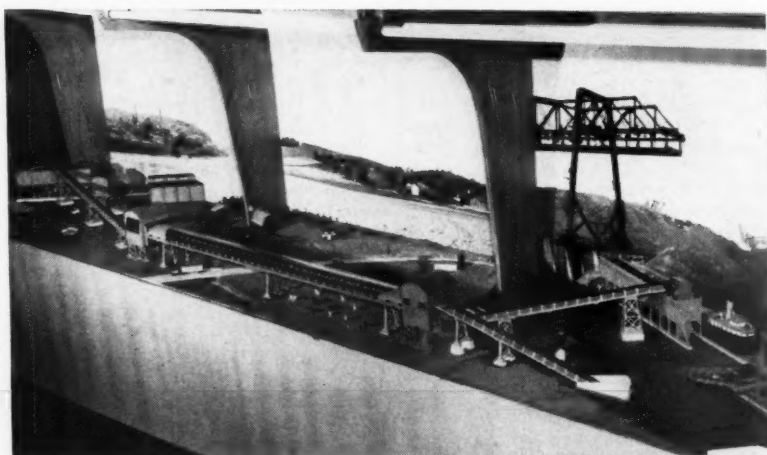
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## Model Riverlake Conveyor



A working model in miniature of the Riverlake Belt Conveyor Lines system, that will transport coal and iron ore between Lake Erie and the Ohio River, has been constructed by the Goodyear Tire & Rubber Co. Containing 6776 working parts, the Riverlake model will be installed in a specially built trailer with glass side and shown throughout the state of Ohio.

The model's moving belts transport miniature coal in one direction and make-believe iron ore in the other from the waterfront terminals. The central section depicts the elevated two-way main line structure in the open country as it crosses Ohio by the way of Youngstown.

Riverlake officials announced that legislation to give belt conveyor trans-

portation the status of a common carrier will be introduced in the Ohio Legislature again in 1955. The Legislature already has approved a pipeline to move pulverized coal from Ohio mines to Cleveland.

## New Geophysical Curriculum

The Georgia Institute of Technology recently established an undergraduate curriculum leading to the Bachelor of Science in Physics, *Geophysics Option*. Requirements are substantially those suggested by the Geophysical Education Committee of the American Institute of Mining and Metallurgical Engineers in 1943, including the equivalent of an undergraduate major in physics with minors in both mathematics and geology, as well as appropriate work in chemistry and engineering. Already there are 23 on departmental rolls, five of whom are graduating to contracting, mining, and oil companies.

## Discover Pre-Cambrian Coal

Accidental discovery of a high quality hard coal in Michigan's upper peninsula has raised the possibility of important new coal fields elsewhere in Pre-Cambrian rock, according to Michigan Conservation Director, G. E. Eddy. While searching for uranium last summer, geologists stumbled over the coal six miles north of Iron River near the iron mining shaft sunk there 60 years ago. Nothing has been disclosed about the discovery pending results of a study.

Previously, geologists had believed that no coal was formed before plant and animal life emerged from the water more than 300,000,000 years ago. Most of the world's known coal deposits were laid down in an age that started 280,000,000 years ago. But this coal, based on preliminary studies, is well over 500,000,000 years old, and unlike most other coal, was laid down in water by water-dwelling plants.

The Geographical Society of America is financing scientific exploration this summer. Depending on results, geologists throughout the world may be looking for deposits in vast areas of pre-Cambrian rock where they previously were sure no coal existed. These rocks extend over much of eastern Canada, small parts of northeastern United States and parts of Russia.

The first samples went to the laboratories of the Jones & Laughlin Ore Co. They were found to be coal containing more than 86 percent free carbon. They look and act much like anthracite. No attempt will be made to assess the commercial possibilities of the deposits, said L. P. Barrett, of the Atomic Energy Commission, head of the crew which found the coal while looking for uranium. He added that it is doubtful whether there is enough to make a profitable mining operation.

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## APCA Meets

The 47th Annual Meeting of the Air Pollution Control Association was held in Chattanooga, Tenn., on May 3-6, inclusive. This was the only meeting devoted exclusively to air pollution and its control held in this country. About 600 management executives and other representatives from industry, research scientists and air pollution control officials attended the four-day meeting. Some 35 technical papers were presented covering the subjects of coal combustion, incineration, petroleum, municipal problems, dusts and fumes, steel, odors, measurements and meteorology.

W. C. L. Hemeon, Director of Engineering of the Industrial Hygiene Foundation at Mellon Institute, was Chairman of the Program Committee.

The Air Pollution Control Association was founded in 1907.

## Recruiting Personnel

(Continued from page 93)

place in magazines articles of popular nature, news photographs, and so on, in addition to a formal advertising campaign.

In looking through the national magazines, one sees a number of large attractive advertisements extolling the applicability and qualities of mineral industry products. However, almost never is any mention made of the men who make these things. These advertisements are almost as interesting to the average reader as the news printed beside them. They are read, and they offer a powerful source of influence. The presentation of employment opportunities in the industry, the men in it and their jobs, their responsibilities in their work and their communities, the spectacular accomplishments from the human viewpoint, the basic technological and economic problems in relation to occupations, are subjects which come to mind as suitable for this purpose. Thus, people would become aware that the industry affords good employment to a large part of the nation's wage earners, and favorable understanding would be developed in the thinking of the general public.

If young people are to be brought into the industry, it is essential that their parents have a favorable attitude toward it. Therefore, it is necessary to develop this attitude in the general public as well as create a desire on the part of high school students to enter the industry.

The basic importance of the mineral industries goes without saying. The necessity for continued production is clear. A good public relations program vigorously pursued by the industry and aimed at those groups of direct and immediate interest will repay management handsomely.

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# Western States

## Acid Plant at Rico

Rico Argentine Mining Co. recently announced it will build a large sulphuric acid plant on its property at Rico, Colo. The proposed plant will serve uranium mills within a radius of approximately 100 miles of Rico.

Immediate raw material for the plant will come from 200,000 tons of pyrites which have been accumulated in a tailings pond as a by-product of its lead-zinc milling operation. After this source is exhausted, the company can draw on its large reserves of pure iron pyrites.

## Golden Cycle Uranium Claims

The Golden Cycle Corp. recently acquired leases on two adjoining groups of uranium claims on the east end of Monogram Mesa in Montrose and San Miguel Counties, Colo., about 12 miles southeast of Naturita, Colo., according to Max W. Bowen, executive vice-president of the corporation. The north end of this ground is approximately six miles southeast of the Joe Dandy Mine, which has had a large steady production of uranium and vanadium ore for several years. The United States Vanadium Co., the Vanadium Corporation of America and the Climax Uranium Co. all have operations on Monogram Mesa, on the south side of the eastern end of Paradox Valley.

Golden Cycle engineers are now making a survey to work out a drilling plan. It is expected the drilling operations will begin in the near future. Ore in this area occurs in the Morrison formation and drilling immediately west and northwest of Golden Cycle's property indicates that uranium ore is found in more than one horizon. The ore horizons on the property are expected at depths ranging from 150 to 830 ft. Outcrops of the Morrison formation, exposed on the rim rocks in the canyons on the southeastern part of the tract, will be prospected simultaneously with the drilling. Ore produced on the above tract will have a relatively short truck haul to the mills at Naturita or Uravan.

The Golden Cycle Corp. has been examining other uranium properties and is now in the process of acquiring additional ground.

Golden Cycle's operation on an

A. E. C. Lease on Atkinson Mesa near Uravan is progressing and shipments have exceeded expectation both as to grade and tonnage. Extensive development work is now in progress to outline other ore bodies and it is expected that shipments will soon be increased materially. The development muck together with the increased ore production keeps the hoist working at capacity. There is sufficient ore already developed to maintain an increased production for several months and with present development work it is expected that sufficient ore will be exposed to maintain average production throughout 1954 and 1955. The mine is working on a two-shift basis, but should conditions warrant it, a third shift could be operated for hoisting any additional tonnage developed.

## Idaho Dredge Plans

Preparations for large-scale dredging are being made in Bear Valley, north of Boise, Idaho. A plant for processing dredge production is scheduled to start operation by September. Construction of dredges started late last year. Monazite, thorium, tantalum, columbium and uranium will be recovered.

## Big Horn Buys Tipple

The Big Horn Coal Co. at Sheridan, Wyo., recently bought the Monarch Tipple from the Sheridan-Wyoming Coal Co. and has leased all strippable coal in the area from Sheridan-Wyoming. In addition to the tipple and townsite, Big Horn also purchased 80 homes.

## Build Mill Near Butte

Erection of a mill for the concentration of gold, silver and manganese ores is under way north of Walker, Mont., a suburb of Butte, Mont., on the Marget Ann property of the Mitchell Mining Co. Contract Milling Co., of Spokane, will build the plant. The mining company has done considerable development work and is deepening its shaft on the property.

## Why Search for

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- ★ Produces results never before possible
- ★ Can be used for oil field surveys
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WORLD'S LARGEST MANUFACTURERS OF PORTABLE RADIATION INSTRUMENTS

## New Johns-Manville Plant

Johns-Manville Corp. has announced plans for the construction of a new plant at Lompoc, Calif., for the manufacture of synthetic silicates, a new line of products made from diatomaceous earth. For many years Johns-Manville has quarried the Lompoc diatomite deposit.

Products to be made in the new plant will include a variety of synthetics for use as inert absorbents, bulking agents or extenders in paints, rubber, paper, cleansers, insecticides, fertilizers, dry cleaning, petroleum and other fields, according to O. B. Westmont, manager of the firm's celite plant.

## Review Ore-Sampling Practices

A review of sampling procedures at major uranium ore-buying stations on the Colorado Plateau and adjacent areas is being conducted by the Colorado School of Mines Research Foundation, Inc., under a contract with the U. S. Atomic Energy Commission.

The current review is in the nature of a re-check, since the same research foundation made an original survey of uranium ore-sampling practices in this region in the latter part of 1952. At that time, the foundation reported that there was a wide difference in

sampling procedure at the various operations, but that the survey disclosed no evidence of intentional tampering with sample devices or any other irregularities which might be intended to deliberately defraud either the buyer or seller of uranium ores.

The research foundation began the present survey in early June. The foundation will review and inspect sampling installations at the following uranium ore-buying stations: U. S. Vanadium Co. at Rifle, Colo., Thompson, Utah, and Uravan, Colo.; Climax Uranium Co. at Grand Junction, Colo.; American Smelting and Refining Co. at Monticello, Utah, Shiprock, N. M., and Edgemont, S. D.; the Anaconda Copper Mining Co. at Bluewater, N. M.; and the Vanadium Corp. of America at Durango and Naturita, Colo.

The research foundation also will request such check sampling of Commission-owned ores at the various plants as it may deem necessary.

On May 6, 1954, the Grand Junction Operations Office issued a public statement to the effect that uranium ore-sampling techniques at the major ore-buying stations had reached a high degree of efficiency. This statement was based on the results of a careful check on sampling plants by the AEC in the preceding 16 months.

## Unique Mining Operation

Washington Non-Metallics, Inc., at Chewelah, Wash., has purchased a new portable crushing and screening plant which will enable it to increase production.

The company produces marble chips for floors and interiors. The products are made from varied colored dolomite and limestone mined at 16 quarries in the Chewelah area.

The new portable unit will be moved from quarry to quarry. The plant's output will be trucked to the nearest rail siding for direct shipment to consumers or to the firm's Chewelah warehouse.

## Reopen Alaska Laboratory

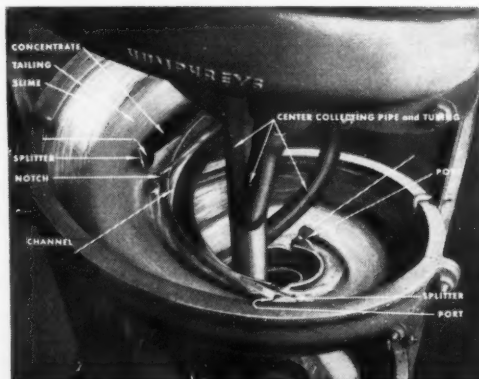
As an aid to uranium prospectors, the U. S. Geological Survey will reopen its radioactivity testing laboratory at College, Alaska. Located in space made available by the University of Alaska, it will be opened during the summer field season and will determine, free of charge, the radioactivity of any samples submitted by the public. Meanwhile, the Survey will continue its reconnaissance aimed at locating uranium bearing material in Alaska.

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*treat 4,500,000 tons of flotation tailing annually*

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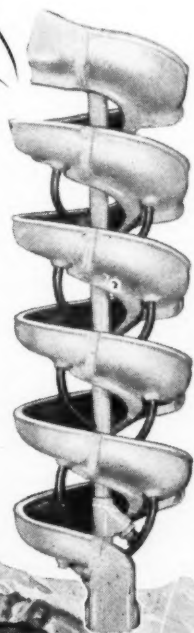
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### Install Clay Kiln

Baukol-Noonan, Inc., a Noonan, N. D., lignite stripping company, is installing clay processing equipment at its operations. Included is a 6 by 60-ft steel-jacketed kiln, crushers, conveyors and a large burning unit to process clay. The clay which lays beneath the Noonan coal bed will be used in the manufacture of building blocks.

### Sell Mines in Idaho

Stockholders of the Silver Leader Mines, Inc., and Silver Center Mining Co. have approved the sale of their properties in the Summit mining district east of Mullan, Idaho, to Uranium Mines, Inc. Both the Silver Leader and Silver Center properties are in the eastern part of the Coeur d'Alene district near the Idaho-Montana border. Bulldozer trenching and surface exploration is now in progress on both properties.

Uranium Mines, Inc., incorporated early this year, has heretofore centered its attention on uranium prospects in southeastern Utah.

### Potash Drilling Started

Potash Chemical Co., a Utah corporation, has announced the start of drilling for carnallite and sylvite deposits south of Greenriver in Grand County, Utah. The firm has from 5000 to 20,000 acres under potash leases from the federal government in this area. About 250,000 acres in Utah and Colorado are held under similar lease by the firm.

### Butte First Aid Contest

The annual first aid contest, sponsored by Anaconda Copper Mining Co. on Miners Union Day at Butte, Mont., was won by the Lexington mine entry. The event was a part of the annual celebration and holiday of the Butte Miners Union, celebrating its 76th birthday this year. The Union is one year older than Butte.

The Lexington team scored 2478 points, one more than the Anselmo mine. The Belmont-Emma squad was third with 2474. Percentage of perfection scores were: Lexington, 99.12; Anselmo, 99.08, and Belmont-Emma, 98.96. In all, 10 teams competed.

Each team worked five problems. The highest possible score was 2500. This was the closest first aid contest in the history of the event which has been held 34 times since 1915. Only four points separated the first and third teams.

Members of the winning Lexington team were captain Edward Sullivan, Bert Pfrimmer, James Monahan, Patrick Thornton, James Garrett, Raymond Karvinen, Edward Gelling and Michael Kopko, instructor. Safety engineer for the Lexington mine is W. L. Smith.

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U. S. VANADIUM  
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HOWE SOUND  
CALERA MINING  
HOMESTAKE  
TELLURIDE MINES  
IDARADO  
CANANEA CONSOLIDATED  
COPPER CO.  
ANACONDA  
VICTOR CHEMICAL WORKS  
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### Record Mill to Work Again

Arrangements have been completed for the resumption of milling operations at the flotation plant of the Colorado Reduction Corp., in the Alma district of Colorado. The new company has taken over the old Record mill five miles from Alma. The mill has a capacity of 150 tpd. It will treat lead, zinc, silver, gold ore from the company's property on Mt. Bross in Mineral Park.

### Group to Mine Gold

Four men have made a working arrangement to develop the Sanger gold mine in Baker County, Ore., according to the Oregon department of geology and mineral industries. They are James Muir, Donald Olling, Verne Jacobson and William Wendt. They now are readying the property for operation. Plans are to mine and mill ore from a shoot on a new vein prospected by Wendt a few years ago and to do additional prospecting.

### Uranium in Central Wyoming

Extensive work on what may be the first uranium ore production in central Wyoming is reported well under way near Hiland, Wyo. The B. S. & K. Development Co., headquartered at Riverton, Wyo., said it has exposed several outcrops of ore in Tertiary sandstone. As soon as they receive an AEC license to sell ore, the company will start shipping to the nearest ore buying station.

The firm plans to continue proving up its claims and will start core drilling to check the beds further. The group has 16 claims under lease and 50 others have been located. Prospecting will be continued as development work proceeds.

### International Mining Days

Over 3500 invitations have been mailed to mining industry representatives in New Mexico, Texas, Arizona, Colorado and Old Mexico for the annual convention of the New Mexico Mining Assn. and the Southwestern International Mining Assn. which will be held in Carlsbad, N. M., October 14-16.

Earl Miller, United States Potash Co., chairman of the program committee, reports that an outstanding program has been assured. A men's golf tournament and a full program for visiting ladies have been planned. New Mexico Governor Edwin L. Mechem has accepted an invitation to attend the convention. W. Page Morris, manager of Duval Sulphur & Potash Co. at Carlsbad, is president of the New Mexico Mining Assn. C. H. (Pat) Murphey of Santa Fe is executive director of the state association.

## U-Ore Shipping Point

A dumping ramp has been built at the railroad siding in South Riverton, Wyo. Erected to allow the dumping of uranium ore, the ramp is 40 ft long with side approaches to accommodate side-dumping ore trucks.

## Wheels of Government

(Continued from page 112)

consideration recommendations which would have: (1) required Federal mine inspectors to notify coal mine operators and mine safety committees a day in advance of a contemplated mine inspection, (2) terminated the Bureau of Mines production activities, (3) required cessation of the experimental work done by the Bureau on production of oil from oil shale at its Rifle, Colorado, plant, (4) directed the Bureau to establish industry advisory committees, and (5) required the Assistant Secretary of Interior for Mineral Resources to establish a more definite policy governing cooperative, trust and working funds.

The four basic recommendations of the report called for reduction of the present nine administrative regions to four; separation of the administration of health, safety and coal mine inspection activities from scientific and research activities; a coordinated strengthening of all statistical and commodity analysis work; and adoption of a plan of organization under which the Washington headquarters of the Bureau would retain policy and program determination, while conduct and management of research are decentralized. The report also called for elimination of overlapping functions and for cooperation with industry and other Government agencies on its research work.

One of the report's statements indicated that the Bureau should work towards bringing State inspection forces up to a par with Federal inspectors of coal mines, with a view that Federal activities in this field might be eventually terminated. This suggestion and those that called for termination of production activities by the Bureau resulted in the House Interior Committee calling a hearing upon the survey report. Undersecretary of Interior Ralph Tudor and Bureau of Mines officials explained the report to the Committee and the effect it would have upon the administration of the Bureau. They indicated that the Bureau would terminate production activities except where essential to national defense and that no action would be taken to terminate Federal coal mine inspections.

As a result of the committee hearing, the Interior Department was requested to prepare an analysis of the recommendations showing which of them would require legislative sanction before being placed into effect.

## VICTAULIC METHOD OF PIPING

### FOR GROOVED PIPE



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**VICTAULIC  
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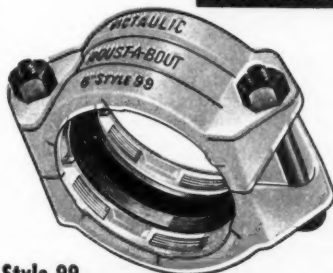
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## Allen Production Rises

Production of coal at the Allen mine of the Colorado Fuel and Iron Corp. in Weston, Colo., reached an all-time high of 3177 tpd on June 9, breaking the previous record of 2882 tpd set by the mine on February 24.

The Allen Mine, considered one of the nation's most modern coal mines, supplies coking coal to CF&I's fully-integrated steel mill at nearby Pueblo, Colo., and has been designed to produce about 6000 tpd when full operating capacity has been reached. The mine was opened in 1952 when production started at the west portal. Early in 1953 production began at the east portal. Underground entries will eventually join the two portals which are about two miles apart.

## Tungsten Mining

(Continued from page 86)

table, which treats the coarsest feed, makes a sulfide middling which is returned to the jig circuit, and also a sand middling. This sand middling, along with the middlings from No. 2, 3, and 4 tables, is returned for re-grind. The middlings of No. 5, 6, 7 and 8 tables are returned to the rake classifier.

The overflow from the rake classifier goes to two eight-ft cone classifiers, the underflow of which is fed to two Deister sand tables. These tables make a concentrate, middling and a tailing.

## Slime Section

Overflow from the four cone classifiers, two in each of the two mill circuits, unite in a common surge tank from which the pulp is fed to three Centriclones.

Underflow from the Centriclones is fed to eight Denver Buchman tilting tables which make a tailing and a rougher concentrate. The rougher concentrate is cleaned on two Denver Buchman tables and then sent to a Deister slime table for upgrading. The concentrate produced is sent to the flotation circuit and the tailing is returned to Denver Buchman cleaner tables. The tailing of the Buchman cleaner tables is sent to two Deister slime tables which make a concentrate, a middling for recleaning and a tailing which is returned to the Buchman rougher tables.

The table concentrates of both the slime and sand sections are treated by sulfide flotation to reject the sulfides.

## Final Separation Magnetic

After removal of the sulfides by flotation, the table concentrate is de-watered, filtered and dried and then combined with the dried jig concentrate. The table and the jig concen-



trate are about equal in amount. The total concentrate is then fed to a small screen in circuit with laboratory rolls to crush the oversize, producing a coarse and a fine feed for the magnetic separator.

The high intensity magnetic separator produces a high grade huebnerite concentrate, a non-magnetic tailing which includes the scheelite, a middling product and a low grade iron product produced by attrition of the rods and liners in the grinding circuit. A bag-type dust collector system is provided for the operations in the magnetic separator room.

Tailings and the middling products produced by this magnetic separator process, along with the dust product from the dust collector, are shipped for chemical treatment to produce artificial scheelite.

The high grade huebnerite concentrate, having a content of 70 to 73 percent  $WO_3$ , is sacked in 100-lb bags and shipped.

#### — Acknowledgments —

The writer thanks Hewitt S. West, president, for his permission to publish this report, and gratefully acknowledges the assistance given by Dr. Carlton D. Hulin and by members of the Staff in its compilation.

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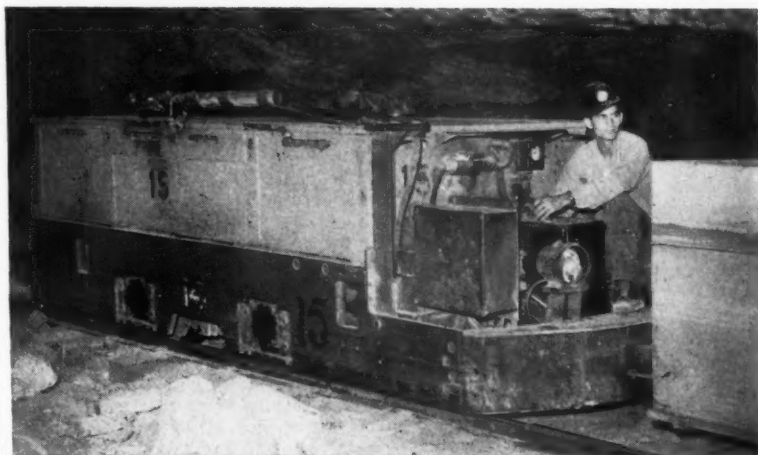
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AUGUST, 1954

133

# battery power

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**Failure-free, uninterrupted power** is the consistent record EDISON batteries have turned in at countless mine operations. Since they do not need critical charge-rate adjustment, EDISON Batteries can be often charged directly from d-c lines. They consistently withstand the irregular charging characteristics of combination locomotives . . . are not harmed by accidental short-circuiting or reverse charging . . . by standing idle during shutdowns or by freezing temperatures. And, EDISON batteries can be fully recharged in six to seven hours.

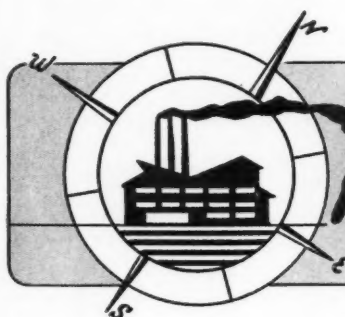
**For the most dependable battery power** in your mining operations, be sure to ask for all of the facts and latest quotations on EDISON batteries now. To request an EDISON field engineer's call or a copy of Bulletin 3826, simply write Edison Storage Battery Division, Thomas A. Edison, Incorporated, West Orange, N. J.

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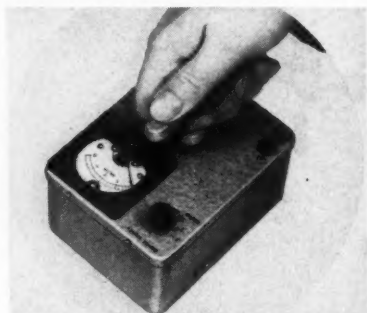
EDISON ALSO MAKES THE FAMOUS "V.P." VOICEWRITER AND THE TELEVOICE SYSTEM



# Manufacturers Forum

## Printed Circuit Geiger Counter

The Radiac Co., Inc., 489 Fifth Ave., New York 17, has announced the Model GC-238 "Prospector," the first

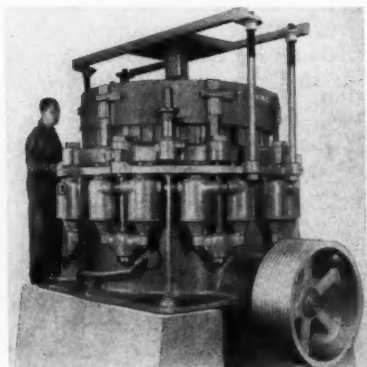


commercially available Geiger counter employing a patented printed circuit.

The "Prospector" utilizes miniaturized components, an electronic high voltage supply operating on standard low voltage batteries, and standard size Geiger tube built into the case for physical protection. It weighs 2¾ lb.

## New Type Crusher

Nordberg Manufacturing Co. recently introduced the Gyradisc crusher to the mining and mineral reduction industries. According to the manufacturers, the crusher provides a

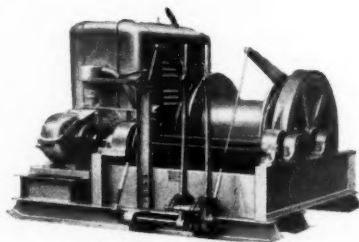


medium for reduction finer than heretofore obtainable in conventional machines. The method of comminution employed in the Gyradisc, is the

Gruender method of reduction. This is a process of alternately impacting and releasing a thick mass of material, resulting in the production of large tonnages of fine particles. The Gyradisc, it is claimed, is particularly suited for preparation of finer feed, when required, for rod or ball mill operation.

## Hoist for Small Mines

With the uranium mines of the Colorado Plateau in mind, Vulcan-Denver has designed a gasoline mine hoist for shaft or slope service at properties remote from electric power which incorporates safety features not usually found with gasoline equipment. Lowering and hoisting are both performed in gear. The two sets of heavy duty post brakes meet the requirements of rigid state mining laws.



The hoist is mounted on an unbreakable steel frame with steel skids attached. All shafts are roller bearing mounted. Arrangement of power unit with hoist results in a very compact construction. Forward and reverse speeds are secured through totally enclosed friction clutches of liberal capacity. For further information write Vulcan Iron Works, 1423 Stout St., Denver, Colo.

## Safe Cement Surface Cleaner

Rust-Oleum Corp., 2799 Oakton St., Evanston, Ill., is now marketing Rust-Oleum Surfa-Etch. This liquid has been designed to prepare concrete and cement floors and masonry surfaces for sealing and refinishing. The manufacturers claim that the etching liquid is fume-free, odor-free and non-inflammable, and will not damage metal surfaces.

## 20-Ton End Dump

Latest of a series of new model off-highway end dump trucks recently announced by the Dart Truck Co., Kansas City, Mo., is a 20-ton capacity truck for which outstanding maneuverability is claimed.



Powered by a diesel engine, 225 or 275-hp (optional) it is available with conventional transmission or torque converter. Two stage springs provide easy riding loaded or unloaded and offer a great degree of protection to tires and the truck itself.

## Cable Reels

Three new designs of explosion tested, hydraulic, electric cable reels, for portable mine equipment are an-



nounced by Ensign Electric & Mfg. Co., Huntington, W. Va.

The smallest reel made is for both vertical and horizontal operation, with a continuous capacity of 100 amp. The largest reel has a capacity of 250 amp and will reel 400 ft of 1/0 cable the manufacturer reports.

## Increase Tractor Power

An increase of horsepower in the Cat D7 track-type tractor has been announced by Caterpillar Tractor Co.

Engine brake horsepower at sea level has been increased from 98 to 108 at 1000 rpm. With this change, the tractor drawbar horsepower is increased from 81 to 90.

The tractor will now develop a drawbar pull of 22,750 lb. The calculated value for the maximum drawbar pull when the engine is lugged down by overload is 25,250 lb.

## Read Speed Easily

A new portable, hand tachometer, featuring a scale-changing device which reduces misreading of its various ranges, has been announced by the General Electric Co. Meter and Instrument Department.

Three different models, each having three ranges, can measure rotational speeds from 2 to 100,000 rpm and linear speeds from 2 to 10,000 fpm with accessories. Accuracy is plus or minus one percent of full scale under all conditions, according to G-E engineers.

The equipment consists of two basic units: a head, to be placed against the moving object; and an indicator, attached by a two-ft flexible electric cable. Weighing only six oz, the unit is small enough to be placed in contact with rotating shafts or moving objects where little space is available.

Marion Power Shovel Co. has acquired controlling interest in The Osgood Co., and the latter's wholly-owned subsidiaries, The General Excavator Co. and The Commercial Steel Castings Co. The Osgood Co. and The General Excavator Co. manufacture lines of power shovels and cranes in sizes up to 2½ cu yds. The Commercial Steel Castings Co. is a foundry operation.

Two National Mine Service Co. executive appointments have been announced by Gordon MacVean, president.

J. J. Mahoney has been named manager of Used Equipment and Rebuilding Sales. Charles F. Barefoot has been appointed purchasing agent for the Southern Divisions of National Mine Service.

The St. Louis headquarters of Leschen Wire Rope Division, H. K. Porter Co., Inc., has moved to its new general office at 2727 Hamilton Ave. The new location is on the present company property, just around the corner from the old. The St. Louis postal zone number (12) and the telephone number (EVergreen 5-1241) remain the same.

## Chemical Feeder

The introduction of a new precision liquid chemical feeder fabricated entirely from rigid, unplasticized Geon vinyl plastic reflects the increased usage of this material in the chemical industry. Replacing stainless steel used in the old model, the plastic resists the corrosive effects of acids and chemicals fed through the reagent dis-



tributor. The electrically driven feeder is manufactured by The Clarkson Co., 564 Market St., San Francisco.

The machine, called Clarkson Feeder Model E, weighs 20 lb and is about 20 in. long, 14 in. high and 12 in. wide. Flow rate of the liquid to be dispensed from the feeder can be adjusted from a few drops per minute to 750 gals per day.

## — Announcements —

Donald G. Ashe has joined the engineering staff of The Allen-Sherman-Hoff Pump Co., after leaving the Cananea Consolidated Copper Co., Sonora, Mexico.

Heyl & Patterson, Inc., Pittsburgh, Pa., and Charles E. Agnew of Cleveland have signed a sales agreement giving Heyl & Patterson exclusive marketing rights to the Agnew Sintering Machine. Agnew will serve in a consulting capacity to Heyl & Patterson in the application of this equipment.

Charles M. George, sales administrator for the Gardner-Denver Co., has been appointed assistant to its president.

J. W. Gardner, who recently was elected to serve as a member of the board of directors, has been appointed administrative assistant.

B. P. Spann, director of personnel, was elected vice-president.

George W. Gutekunst, formerly district manager for Gardner-Denver in Los Angeles, has been transferred to the executive offices in Quincy, Ill., to assume his new position as general sales manager.

## CATALOGS AND BULLETINS

**BATTERY MAINTENANCE.** *The Electric Storage Battery Co., Box 8109, Philadelphia 1, Pa.* Form 5063 is devoted to explaining storage battery maintenance practice. It is particularly suitable for distribution to maintenance personnel and others who might have to deal with batteries.

**CONCENTRATING TABLES.** *Deister Machine Co., 1933 E. Wayne St., Fort Wayne 4, Ind.* This bulletin gives full details on the three types of Plat-O tables manufactured by the company. Installation details of the tables are illustrated for either right or left-hand operation. Ask for Bulletin No. 36.

**PROPER LUBRICATION.** *Fiske Brothers Refining Co., 129 Lockwood St., Newark 5, N. J.* A treatise on the important subject of modern lubrication. Requests for "Proper Lubrication, The Life Blood of All Machinery" should be addressed to Lubriplate Division at above address, on company letterhead.

**GARDNER-DENVER CATALOG.** *Gardner-Denver Co., Quincy, Ill.* Bulletin GP-100 is a compact catalog covering the complete line of Gardner-Denver pumps, compressors, rock drills and pneumatic equipment used in the construction and mining industry. Additional bulletins containing full descriptive information are also available on most products for those who require more specific details than are found in the general catalog.

**ROCK BOLTING.** *Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.* Form 4155 describes rock bolting procedures and techniques. It deals with the theory of rock bolting and outlines advantages and disadvantages of the practice. Intended as a general guide for rock bolting, a complete line of equipment manufactured for this application is described.

**ROD MILLS.** *Allis-Chalmers Manufacturing Co., 972 S. 70th St., Milwaukee, Wis.* How to meet increasing demands for higher specification aggregates is discussed in Bulletin 07B8104. It describes characteristics of the rod mill which make it suitable for producing specification sand. It also carries dimensional layouts for mills along with dimension and capacity tables for each.

**RUBBER HOSE AND BELTING.** *Carlisle Rubber Co., Inc., Dept. A-10, 64 Park Place, New York 7, N. Y.* Catalog contains complete information and prices on many types of rubber hose and belting.

**SCRAPERS AND BOTTOM-DUMPS.** *Euclid Div., General Motors Corp., Cleveland 17, Ohio.* Catalog No. 251 provides detailed information on a 17-yd bottom-dump, 20 cu yd capacity heaped. The Euclid twin-power scraper is described in Catalog No. 551. This unit hauls loads of 18 cu yd, struck, at speeds up to 31 mph.

**THESE USERS' VIEWS.** *Bucyrus-Erie Co., Publicity Dept., South Milwaukee, Wis.* A 25-mm sound-color motion picture showing more than 30 of the company's different excavating, loading and material handling jobs. Star of the film is the company's line of ¾ to 4-cu yd general purpose excavators and cranes. Film is available from the company at the above address. Make your request on letterhead.



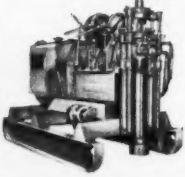
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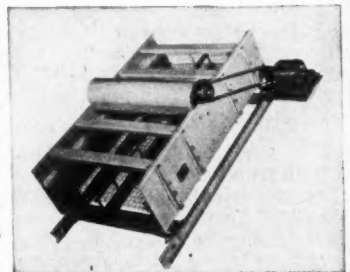


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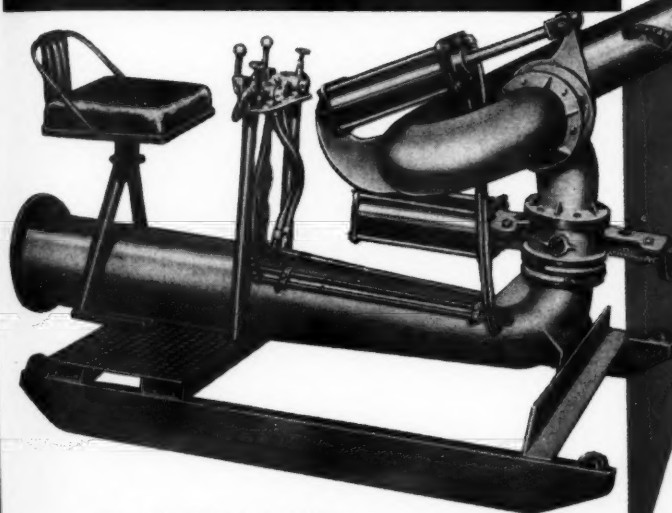
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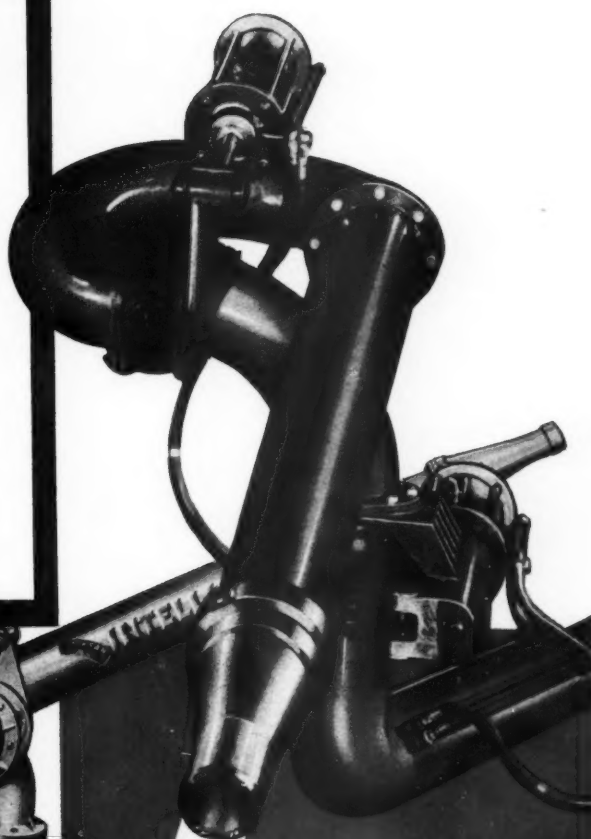


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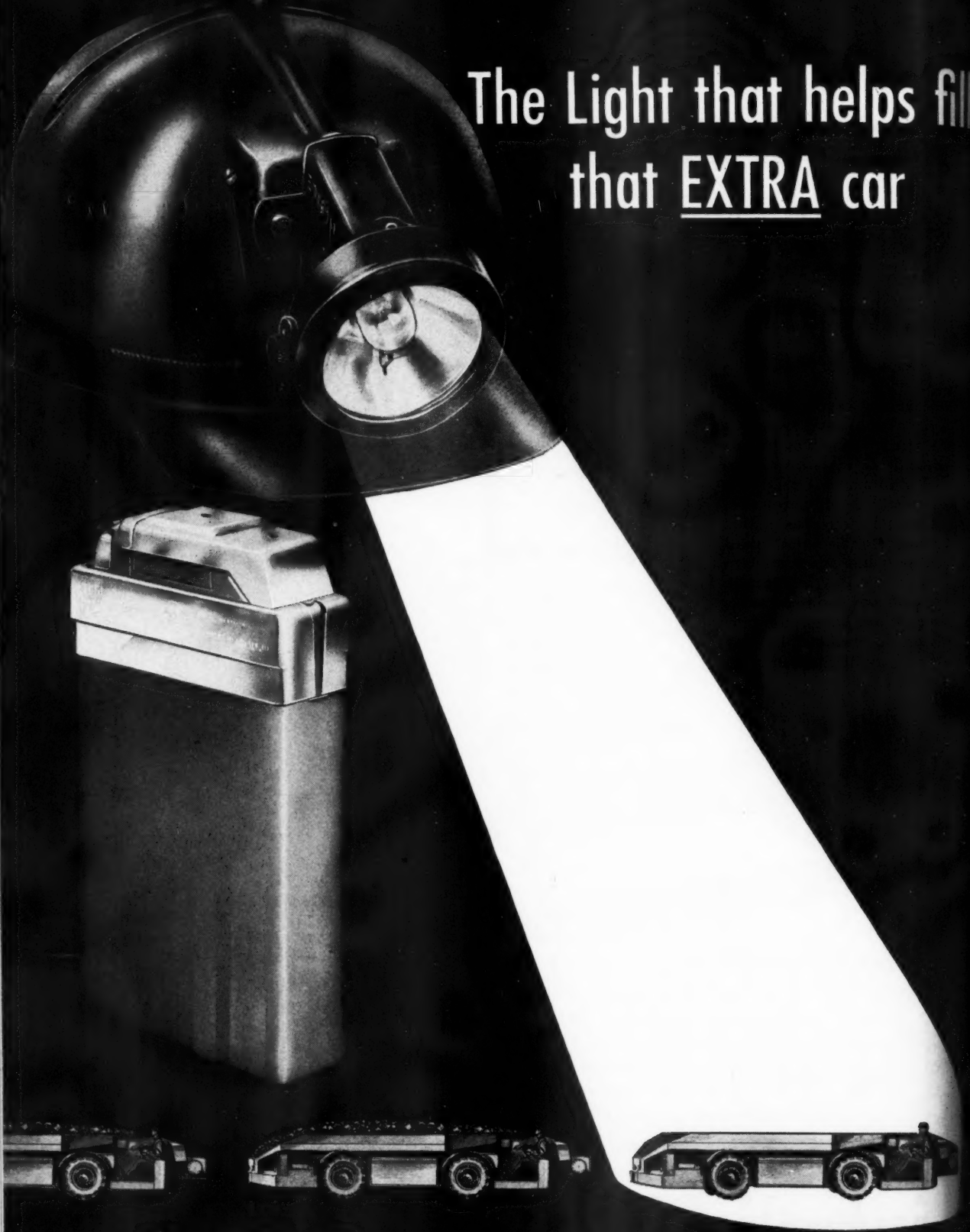
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